

Long Term Resource Monitoring Program

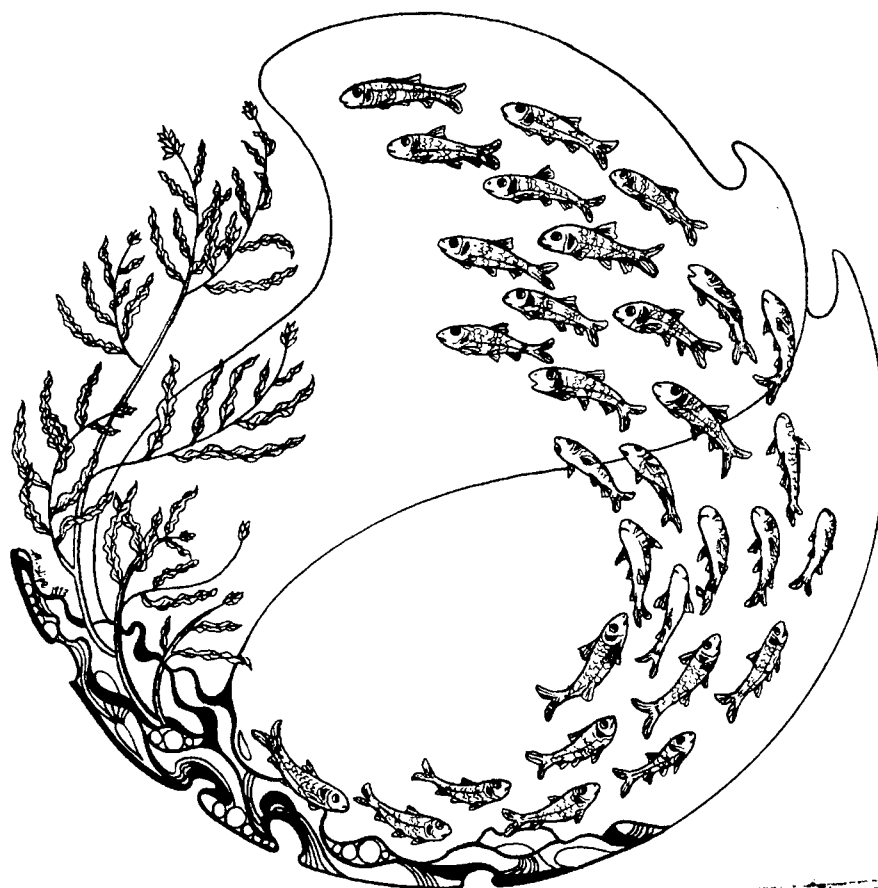
## Program Report

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# 1993 Annual Status Report

*A Summary of Fish Data in Six Reaches of the  
Upper Mississippi River System*



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# **1993 Annual Status Report**

## *A Summary of Fish Data in Six Reaches of the Upper Mississippi River System*

by

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## Preface

This report is a product of the Long Term Resource Monitoring Program (LTRMP) for the Upper Mississippi River System. The LTRMP was authorized under the Water Resources Development Act of 1986 (Public Law 99-662) as an element of the U.S. Army Corps of Engineers' Environmental Management Program. The LTRMP is being implemented by the Environmental Management Technical Center, a U.S. Geological Survey science center, in cooperation with the five Upper Mississippi River System (UMRS) States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin. The U.S. Army Corps of Engineers provides guidance and has overall Program responsibility. The mode of operation and respective roles of the agencies are outlined in a 1988 Memorandum of Agreement.

The UMRS encompasses the commercially navigable reaches of the Upper Mississippi River, as well as the Illinois River and navigable portions of the Kaskaskia, Black, St. Croix, and Minnesota Rivers. Congress has declared the UMRS to be both a nationally significant ecosystem and a nationally significant commercial navigation system. The mission of the LTRMP is to provide decision makers with information for maintaining the UMRS as a sustainable large river ecosystem given its multiple-use character. The long-term goals of the Program are to understand the system, determine resource trends and effects, develop management alternatives, manage information, and develop useful products.

Data (factual record) and information (usable interpretation of data) are the primary products of the LTRMP. Data on water quality, vegetation, aquatic macroinvertebrates, and fish are collected using a network of six field stations on the Upper Mississippi and Illinois Rivers. Analysis, interpretation, and the reporting of information are conducted at the six field stations and at the Environmental Management Technical Center, the operational center of the LTRMP. Informational products of the LTRMP include professional presentations, reports, and publications in the open and peer-reviewed scientific literature.

This document is an annual status report for 1993, containing a synthesis of data from fish populations and communities in the Upper Mississippi River System. This report satisfies, for 1993, Task 2.2.8.4, *Evaluate and Summarize Annual Results* under Goal 2, *Monitor and Evaluate the Condition of the Upper Mississippi River Ecosystem* as specified in the Operating Plan for the Long Term Resource Monitoring Program (USFWS 1993). This report was developed with funding provided by the Long Term Resource Monitoring Program. The purposes of this annual synthesis report are to provide (1) a systemwide summary of data in standardized tables and figures, and (2) initial identification and interpretation of observed spatial and temporal patterns. The primary data summarized in this report are available from the Environmental Management Technical Center.

# **1993 Annual Status Report**

## *A Summary of Fish Data in Six Reaches of the Upper Mississippi River System*

by

Steve Gutreuter, Randy W. Burkhardt, Mark Stopyro, Andrew Bartels,  
Eric Kramer, Melvin C. Bowler, Frederick A. Cronin, Dirk W. Soergel,  
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### **Abstract**

The Long Term Resource Monitoring Program (LTRMP) completed 1,994 collections of fishes from stratified random and permanently fixed sampling locations in six study reaches of the Upper Mississippi River System during 1993. Collection methods included day and night electrofishing, hoop netting, fyke netting (two net sizes), gill netting, seining, and trawling in select aquatic area classes. The six LTRMP study reaches are Pools 4 (excluding Lake Pepin), 8, 13, and 26 of the Upper Mississippi River, an unimpounded reach of the Mississippi River near Cape Girardeau, Missouri, and the La Grange Pool of the Illinois River. A total of 62–78 fish species were detected in each study reach. For each of the six LTRMP study reaches, this report contains summaries of: (1) sampling efforts in each combination of gear type and aquatic area class, (2) total catches of each species from each gear type, (3) mean catch-per-unit of gear effort statistics and standard errors for common species from each combination of aquatic area class and selected gear type, and (4) length distributions of common species from selected gear types.

### **Introduction**

The objective of this report is to summarize key features of fish populations and communities from samples collected by field stations of the Long Term Resource Monitoring Program (LTRMP) from the Upper Mississippi River System (UMRS). The fisheries component of the LTRMP is charged, in part, with monitoring and reporting trends in the status of selected fish populations and fish communities of the UMRS (USFWS 1993). Intended as a data summary, this report contains only minimal descriptive syntheses. The LTRMP is required to produce trend reports at 5-year intervals that contain quantitative analyses and systemic syntheses of temporal changes. Further, the LTRMP uses these monitoring data in analyses to address specific issues of concern to LTRMP partners; these analyses are reported in special reports and in the open scientific literature.

Fish are the primary biotic object of recreational and commercial use on the UMRS. During 1982, UMRS fisheries provided more than 8.5 million activity days of sportfishing that generated more than \$150 million in direct expenditures (Fremling et al. 1989). Commercial fisheries of the UMRS were valued at more than \$2.4 million in 1987 (UMRCC 1989). Adverse trends in fisheries of the UMRS would have detrimental effects on recreation and the regional economy. Therefore, it is important to detect any adverse trends as they occur so that remedial actions can be considered.

Monitoring of and research on fish are also important because fish often affect other ecosystem elements. Although documentation of the effects of fish on other biota is derived primarily from lakes and reservoirs (Northcote 1988), and traditional thought maintains that the dynamics of river biota are influenced primarily by abiotic factors, recent evidence shows that the dynamics of fish assemblages in temperate rivers are regulated in part by biotic factors (Welcomme et al. 1989). Fish may exert influences on other biota in riverine ecosystems and may, therefore, be of broad ecological importance. For example, evidence shows that common carp (*Cyprinus carpio*), an abundant species in the UMRS, may depress or even eliminate macrophytes either through uprooting or disturbance of substrate (Cahn 1929; Macrae 1979). Effects of fish on benthic

macroinvertebrates are well known (Northcote 1988). Therefore, trends in abundance of fish may be crucial in explaining trends in abundance of other riverine biota.

Resource monitoring is an important component of long-term ecological research on processes governing large-scale ecosystems. It is nearly impossible to perform experimental manipulations of the UMRS on large spatial scales and to incorporate replication. Long-term data from standardized sampling programs that span natural or anthropogenic disturbances are the only means for gaining an understanding of large-scale processes governing large river systems (Sparks et al. 1990). Further, the LTRMP fisheries component will provide support for the formulation and investigation of research hypotheses concerning smaller scales using focused experimentation. Therefore, the combination of routine monitoring coupled with more intensive investigation of consequences of disturbances and experimentation at reduced spatial and temporal scales is the only available means for better understanding the UMRS and for identifying viable management alternatives.

## **Study Areas**

The LTRMP study areas include six river reaches within the Upper Mississippi River System, five on the Mississippi River and one on the Illinois River (Figure). Study areas are referred to herein by the navigation pool designations according to the U.S. Army Corps of Engineers lock and dam system. Mississippi River navigation pools studied are Pool 4 (river mile 752 to 797), Pool 8 (679 to 703), Pool 13 (523 to 557), Pool 26 (202 to 242), and an unimpounded, open river reach (29 to 80). The remaining study area is the La Grange Pool of the Illinois River (80 to 158).

The LTRMP study areas were chosen, in part, to reflect important differences in geomorphology, floodplain land-use practices, and navigation management strategies that exist within the UMRS (Table 1). Pools 4, 8, and 13 are located in an upper impounded reach characterized by high percentages of open water and aquatic vegetation and low agricultural use (Figure). Relatively high percentages of the total aquatic area in these study reaches are composed of contiguous (to the main channel) backwaters, and relatively low percentages are composed of main channel (Table 1). Qualitatively, Pools 4, 8, and 13 are geomorphically complex and richly braided by side channels and backwaters. Pool 26, in a lower impounded reach, is characterized by relatively low percentages of open water and aquatic vegetation and a high percentage of agriculture in the floodplain. A low percentage of the total aquatic area is composed of contiguous backwaters, and commensurately, a high percentage is composed of the main channel. The Open River study reach is characterized by low percentages of open water and aquatic vegetation and 71.5% agriculture in the floodplain. Of the total aquatic area in the Open River study reach, only 1.8% is contiguous backwater and 79% is main channel (Table 1). The La Grange Pool is similar to Pool 26 in floodplain composition, but is similar to Pools 8 and 13 in composition of the aquatic area (Table 1). In fact, the La Grange Pool has the greatest percentage (52.2%) of contiguous backwaters among the six LTRMP study areas.

Sampling sites are randomly selected within nine strata for each study area: backwater contiguous shoreline (BWCS), backwater contiguous offshore (BWCO), impounded shoreline (IMPS), impounded offshore (IMPO), main channel border unstructured (MCBU), main channel border wing dam (MCBW), side channel border (SCB), tributary mouth (TRI), and tailwater (TWZ). The definitions of sampling strata are based on geomorphic regions that have been mapped and entered into a Geographical Information System.





**Figure.** Long Term Resource Monitoring Program study reaches.

**Table 1.** Key features of the floodplain and aquatic area compositions of the Long Term Resource Monitoring Program's five Mississippi and Illinois River study reaches. Aquatic area is that portion of the floodplain that is inundated at normal water elevations. Main channel includes area in the navigation channel and main channel border areas. Data on floodplain composition are from Lastrup and Lowenberg (1994). Data on the composition of aquatic areas are from the Long Term Resource Monitoring Program aquatic areas spatial database.

Study reach	Floodplain area (ha)	Floodplain composition (%)			Aquatic area composition (%)	
		Open water	Aquatic vegetation	Agriculture	Contiguous backwater	Main channel
Pool 4	28,358	50.5	10.0	12.1	21.3	10.5
Pool 8	19,068	40.1	14.4	0.9	30.6	14.2
Pool 13	34,528	29.7	8.6	27.9	28.5	24.7
Pool 26	51,688	13.4	1.4	65.4	17.3	54.4
Open River	105,244	9.9	0.6	71.5	1.8	79.0
La Grange Pool, Illinois River	89,554	15.7	2.2	59.6	52.2	21.3

## Methods

### *Sampling Methods*

The LTRMP fish monitoring design and sampling protocols, including historical changes, are given in Gutreuter et al. (1995). Readers requiring detailed descriptions should refer to that report. An abbreviated description of the LTRMP design and protocols follows; a list of common and scientific names of fish used in this report is found in Table 2.

In this report, we summarize the annual increment of fish data obtained by the LTRMP from stratified random and fixed-site sampling during 1993. The LTRMP converted to a stratified, random fish sampling design in 1993, augmented with limited sampling at a few permanently fixed sites. Selected aquatic areas, chosen for their enduring geomorphic features (Wilcox 1993), were used as sampling strata. These aquatic areas were largely compatible with the habitat classes used in 1990–92, with the exception of the 1990–92 classifications, which were based on the presence of aquatic vegetation; those fixed sites were reclassified into strata according to aquatic areas. Each aquatic area is artificially partitioned into 50-m<sup>2</sup> sampling grids beginning with a random origin for each LTRMP study reach (Gutreuter et al. 1995) using the ARC Geographic Information System. Beginning in 1993, sampling sites were randomly chosen from this lattice of square grids. Whenever it is discovered that a randomly selected site cannot be sampled because of environmental constraints (e.g., limited physical access or high flow), the nearest accessible site from a list of randomly selected alternate sites is sampled within the same aquatic area class.

**Table 2.** Long Term Resource Monitoring Program list of fishes, arranged phylogenetically by family, then alphabetically by genus and species. Hybrids are listed after respective genera. Nomenclature follows Robins et al. (1991).

Common name	Family name	Scientific name
<b>Petromyzontidae</b>		
Chestnut lamprey		<i>Ichthyomyzon castaneus</i>
Northern brook lamprey		<i>I. fossor</i>
Silver lamprey		<i>I. unicuspis</i>
Least brook lamprey		<i>Lampetra aepyptera</i>
American brook lamprey		<i>L. appendix</i>
Sea lamprey		<i>Petromyzon marinus</i>
<b>Carcharhinidae</b>		
Bull shark		<i>Carcharhinus leucas</i>
<b>Acipenseridae</b>		
Lake sturgeon		<i>Acipenser fulvescens</i>
Pallid sturgeon		<i>Scaphirhynchus albus</i>
Shovelnose sturgeon		<i>S. platyrhynchus</i>
<b>Polyodontidae</b>		
Paddlefish		<i>Polyodon spathula</i>
<b>Lepisosteidae</b>		
Spotted gar		<i>Lepisosteus oculatus</i>
Longnose gar		<i>L. osseus</i>
Shortnose gar		<i>L. platostomus</i>
Alligator gar		<i>L. spatula</i>
<b>Amiidae</b>		
Bowfin		<i>Amia calva</i>
<b>Hiodontidae</b>		
Goldeye		<i>Hiodon alosoides</i>
Mooneye		<i>H. tergisus</i>
<b>Anguillidae</b>		
American eel		<i>Anguilla rostrata</i>
<b>Clupeidae</b>		
Alabama shad		<i>Alosa alabamae</i>
Skipjack herring		<i>A. chrysochloris</i>
Alewife		<i>A. pseudoharengus</i>
Gizzard shad		<i>Dorosoma cepedianum</i>
Threadfin shad		<i>D. petenense</i>

Table 2. Continued.

Common name	Family name	Scientific name
Cyprinidae		
Central stoneroller		<i>Campostoma anomalum</i>
Largescale stoneroller		<i>C. oligolepis</i>
Goldfish		<i>Carassius auratus</i>
Lake chub		<i>Couesius plumbeus</i>
Grass carp		<i>Ctenopharyngodon idella</i>
Red shiner		<i>Cyprinella lutrensis</i>
Spotfin shiner		<i>C. spiloptera</i>
Blacktail shiner		<i>C. venusta</i>
Steelcolor shiner		<i>C. whipplei</i>
Common carp		<i>Cyprinus carpio</i>
Goldfish × common carp		<i>Carassius auratus</i> × <i>C. carpio</i>
Gravel chub		<i>Erimystax x-punctatus</i>
Western silvery minnow		<i>Hybognathus argyritis</i>
Brassy minnow		<i>H. hankinsoni</i>
Mississippi silvery minnow		<i>H. nuchalis</i>
Plains minnow		<i>H. placitus</i>
Silver carp		<i>Hypophthalmichthys molitrix</i>
Bighead carp		<i>H. nobilis</i>
Striped shiner		<i>Luxilus chrysocephalus</i>
Common shiner		<i>L. cornutus</i>
Rosefin shiner		<i>Lythrurus ardens</i>
Ribbon shiner		<i>L. fumeus</i>
Redfin shiner		<i>L. umbratilis</i>
Speckled chub		<i>Macrhybopsis aestivalis</i>
Sturgeon chub		<i>M. gelida</i>
Sicklefin chub		<i>M. meeki</i>
Silver chub		<i>M. storeriana</i>
Pearl dace		<i>Margariscus margarita</i>
Hornyhead chub		<i>Nocomis biguttatus</i>
River chub		<i>N. micropogon</i>
Golden shiner		<i>Notemigonus crysoleucas</i>
Bigeye chub		<i>Notropis amblops</i>
Pallid shiner		<i>N. amnis</i>
Pugnose shiner		<i>N. anogenus</i>
Emerald shiner		<i>N. atherinoides</i>
River shiner		<i>N. blennius</i>
Bigeye shiner		<i>N. boops</i>
Silverjaw minnow		<i>N. buccatus</i>
Ghost shiner		<i>N. buechanani</i>
Ironcolor shiner		<i>N. chalybaeus</i>
Bigmouth shiner		<i>N. dorsalis</i>
Blackchin shiner		<i>N. heterodon</i>
Blacknose shiner		<i>N. heterolepis</i>
Bluehead shiner		<i>N. hubbsi</i>
Spottail shiner		<i>N. hudsonius</i>
Ozark minnow		<i>N. nubilus</i>
Rosyface shiner		<i>N. rubellus</i>
Silverband shiner		<i>N. shumardi</i>
Sand shiner		<i>N. stramineus</i>
Weed shiner		<i>N. texanus</i>
Mimic shiner		<i>N. volucellus</i>

Table 2. Continued.

Common name	Family name	Scientific name
Channel shiner		<i>N. wickliffi</i>
Pugnose minnow		<i>Opsopoeodus emiliae</i>
Suckermouth minnow		<i>Phenacobius mirabilis</i>
Northern redbelly dace		<i>Phoxinus eos</i>
Southern redbelly dace		<i>P. erythrogaster</i>
Bluntnose minnow		<i>Pimephales notatus</i>
Fathead minnow		<i>P. promelas</i>
Bullhead minnow		<i>P. vigilax</i>
Flathead chub		<i>Platygio gracilis</i>
Blacknose dace		<i>Rhinichthys atratulus</i>
Longnose dace		<i>R. cataractae</i>
Creek chub		<i>Semotilus atromaculatus</i>
<b>Catostomidae</b>		
River carpsucker		<i>Carpiodes carpio</i>
Quillback		<i>C. cyprinus</i>
Highfin carpsucker		<i>C. velifer</i>
Longnose sucker		<i>Catostomus catostomus</i>
White sucker		<i>C. commersoni</i>
Blue sucker		<i>Cycleptus elongatus</i>
Creek chubsucker		<i>Erimyzon oblongus</i>
Lake chubsucker		<i>E. sucetta</i>
Northern hog sucker		<i>Hypentelium nigricans</i>
Smallmouth buffalo		<i>Ictiobus bubalus</i>
Bigmouth buffalo		<i>I. cyprinellus</i>
Black buffalo		<i>I. niger</i>
Spotted sucker		<i>Minytrema melanops</i>
Silver redhorse		<i>Moxostoma anisurum</i>
River redhorse		<i>M. carinatum</i>
Black redhorse		<i>M. duquesnei</i>
Golden redhorse		<i>M. erythrurum</i>
Shorthead redhorse		<i>M. macrolepidotum</i>
Greater redhorse		<i>M. valenciennesi</i>
<b>Ictaluridae</b>		
White catfish		<i>Ameiurus catus</i>
Black bullhead		<i>A. melas</i>
Yellow bullhead		<i>A. natalis</i>
Brown bullhead		<i>A. nebulosus</i>
Blue catfish		<i>Ictalurus furcatus</i>
Channel catfish		<i>I. punctatus</i>
Mountain madtom		<i>Noturus eleutherus</i>
Slender madtom		<i>N. exilis</i>
Stonecat		<i>N. flavus</i>
Tadpole madtom		<i>N. gyrinus</i>
Brindled madtom		<i>N. miurus</i>
Freckled madtom		<i>N. nocturnus</i>
Northern madtom		<i>N. stigmatosus</i>
Flathead catfish		<i>Pylodictis olivaris</i>

**Table 2.** Continued.

Common name	Family name	Scientific name
<b>Esocidae</b>		
Grass pickerel		<i>Esox americanus vermiculatus</i>
Northern pike		<i>E. lucius</i>
Muskellunge		<i>E. masquinongy</i>
Tiger muskellunge		<i>E. masquinongy</i> × <i>E. lucius</i>
Chain pickerel		<i>E. niger</i>
<b>Umbridae</b>		
Central mudminnow		<i>Umbra limi</i>
<b>Osmeridae</b>		
Rainbow smelt		<i>Osmerus mordax</i>
<b>Salmonidae</b>		
Cisco		<i>Coregonus artedii</i>
Bloater		<i>C. hoyi</i>
Coho salmon		<i>Oncorhynchus kisutch</i>
Rainbow trout		<i>O. mykiss</i>
Brown trout		<i>Salmo trutta</i>
Brook trout		<i>Salvelinus fontinalis</i>
<b>Percopsidae</b>		
Trout-perch		<i>Percopsis omiscomaycus</i>
<b>Aphredoderidae</b>		
Pirate perch		<i>Aphredoderus sayanus</i>
<b>Amblyopsidae</b>		
Spring cavefish		<i>Chologaster agassizi</i>
<b>Gadidae</b>		
Burbot		<i>Lota lota</i>
<b>Cyprinodontidae</b>		
Northern studfish		<i>Fundulus catenatus</i>
Banded killifish		<i>F. diaphanus</i>
Starhead topminnow		<i>F. dispar</i>
Blackstripe topminnow		<i>F. notatus</i>
Blackspotted topminnow		<i>F. olivaceus</i>
<b>Poeciliidae</b>		
Western mosquitofish		<i>Gambusia affinis</i>

Table 2. Continued.

Common name	Family name	Scientific name
<b>Atherinidae</b>		
Brook silverside		<i>Labidesthes sicculus</i>
Mississippi silverside		<i>Menidia audens</i>
Inland silverside		<i>M. beryllina</i>
<b>Gasterosteidae</b>		
Brook stickleback		<i>Culaea inconstans</i>
Ninespine stickleback		<i>Pungitius pungitius</i>
<b>Cottidae</b>		
Mottled sculpin		<i>Cottus bairdi</i>
Banded sculpin		<i>C. carolinae</i>
Slimy sculpin		<i>C. cognatus</i>
Deepwater sculpin		<i>Myoxocephalus thompsoni</i>
<b>Percichthyidae</b>		
White perch		<i>Morone americana</i>
White bass		<i>M. chrysops</i>
Yellow bass		<i>M. mississippiensis</i>
Striped bass		<i>M. saxatilis</i>
White bass × striped bass		<i>M. chrysops</i> × <i>M. saxatilis</i>
<b>Centrarchidae</b>		
Shadow bass		<i>Ambloplites ariommus</i>
Rock bass		<i>A. rupestris</i>
Flier		<i>Centrarchus macropterus</i>
Banded pygmy sunfish		<i>Elassoma zonatum</i>
Green sunfish		<i>Lepomis cyanellus</i>
Pumpkinseed		<i>L. gibbosus</i>
Warmouth		<i>L. gulosus</i>
Orangespotted sunfish		<i>L. humilis</i>
Bluegill		<i>L. macrochirus</i>
Longear sunfish		<i>L. megalotis</i>
Redear sunfish		<i>L. microlophus</i>
Spotted sunfish		<i>L. punctatus</i>
Bantam sunfish		<i>L. symmetricus</i>
Green sunfish × pumpkinseed		<i>L. cyanellus</i> × <i>L. gibbosus</i>
Green sunfish × warmouth		<i>L. cyanellus</i> × <i>L. gulosus</i>
Green sunfish × orangespotted sunfish		<i>L. cyanellus</i> × <i>L. humilis</i>
Green sunfish × bluegill		<i>L. cyanellus</i> × <i>L. macrochirus</i>
Green sunfish × redear sunfish		<i>L. cyanellus</i> × <i>L. microlophus</i>
Green sunfish × unknown		<i>L. cyanellus</i> × sp.
Pumpkinseed × warmouth		<i>L. gibbosus</i> × <i>L. gulosus</i>
Pumpkinseed × orangespotted sunfish		<i>L. gibbosus</i> × <i>L. humilis</i>
Pumpkinseed × bluegill		<i>L. gibbosus</i> × <i>L. macrochirus</i>
Orangespotted sunfish × longear sunfish		<i>L. humilis</i> × <i>L. megalotis</i>
Bluegill × warmouth		<i>L. macrochirus</i> × <i>L. gulosus</i>
Bluegill × orangespotted sunfish		<i>L. macrochirus</i> × <i>L. humilis</i>

Table 2. Continued.

Common name	Family name	Scientific name
Bluegill × longear sunfish		<i>L. macrochirus</i> × <i>L. megalotis</i>
Bluegill × redear sunfish		<i>L. macrochirus</i> × <i>L. microlophus</i>
Redear sunfish × warmouth		<i>L. microlophus</i> × <i>L. gulosus</i>
Smallmouth bass		<i>Micropterus dolomieu</i>
Spotted bass		<i>M. punctulatus</i>
Largemouth bass		<i>M. salmoides</i>
White crappie		<i>Pomoxis annularis</i>
Black crappie		<i>P. nigromaculatus</i>
White crappie × black crappie		<i>P. annularis</i> × <i>P. nigromaculatus</i>
<b>Percidae</b>		
Crystal darter		<i>Ammocrypta asprella</i>
Western sand darter		<i>A. clara</i>
Eastern sand darter		<i>A. pellucida</i>
Mud darter		<i>Etheostoma asprigene</i>
Greenside darter		<i>E. blennioides</i>
Rainbow darter		<i>E. caeruleum</i>
Bluebreast darter		<i>E. camurum</i>
Bluntnose darter		<i>E. chlorosomum</i>
Iowa darter		<i>E. exile</i>
Fantail darter		<i>E. flabellare</i>
Slough darter		<i>E. gracile</i>
Harlequin darter		<i>E. histrio</i>
Stripetail darter		<i>E. kennicotti</i>
Least darter		<i>E. microperca</i>
Johnny darter		<i>E. nigrum</i>
Cypress darter		<i>E. proelaire</i>
Orangethroat darter		<i>E. spectabile</i>
Spottail darter		<i>E. squamiceps</i>
Banded darter		<i>E. zonale</i>
Yellow perch		<i>Perca flavescens</i>
Logperch		<i>Percina caprodes</i>
Blackside darter		<i>P. maculata</i>
Slenderhead darter		<i>P. phoxocephala</i>
Dusky darter		<i>P. sciera</i>
River darter		<i>P. shumardi</i>
Sauger		<i>Stizostedion canadense</i>
Walleye		<i>S. vitreum</i>
Sauger × walleye		<i>S. canadense</i> × <i>S. vitreum</i>
<b>Sciaenidae</b>		
Freshwater drum		<i>Aplodinotus grunniens</i>
<b>Mugilidae</b>		
Striped mullet		<i>Mugil cephalus</i>



Since 1990, the LTRMP uses day and night electrofishing, fyke nets, seines, small mini fyke nets, hoop nets, and small trawls to sample fish in various strata. The following is a summary of sampling gears according to Gutreuter et al. (1995):

### **Electrofishing**

Electrofishing is conducted with pulsed direct current; boat configuration and power output are standardized (Burkhardt and Gutreuter 1995; Gutreuter et al. 1995). Electrofishing effort is of 15-min duration and is paced so that the boat covers a rectangle of about  $200 \times 30$  m. Day and night electrofishing data from these two methods were combined for length–frequency analysis. The unit of effort is a 15-min run.

### **Hoop Netting**

The LTRMP uses two sizes of hoop nets. The large nets are composed of seven fiberglass hoops with diameters of 1.1 to 1.2 m. These nets are 4.8 m long, contain two finger-style throats, and are constructed of 3.7-cm (bar measure) nylon mesh. The small nets are composed of seven fiberglass hoops with diameters of 0.5 to 0.6 m. The small nets are 3 m long, contain two finger-style throats, and are constructed of 1.8-cm (bar measure) nylon mesh. Hoop nets are deployed separately but in pairs within sampling sites. Both nets are baited with 3 kg of soybean cake. For this report, the estimates from pairs of nets are pooled and therefore treated as a single gear for consistency with the 1990–92 data. The unit of effort is a net-day, which is 24 h of effort by a pair of nets.

### **Seining**

The LTRMP uses 10.7-m-long seines constructed of 3-mm Ace-type nylon mesh. These seines are 1.8 m high and have a  $0.9\text{-m}^2$  bag in the centers. Seines are extended perpendicularly to shorelines and then swept in a  $90^\circ$  arc downstream to the shoreline. The unit of effort is a haul.

### **Fyke Netting**

The LTRMP uses Wisconsin-type fyke nets (trap nets) that contain three sections: the lead, frame, and cab. All netting is 1.8-cm (bar measure) mesh. Leads are 15 m long and 1.3 m high. The spring steel frames are 0.9 m high and 1.8 m wide with two internal wing throats. The cabs are constructed of six steel hoops (0.9 m in diameter) containing two throats. These nets are fished singly from shoreline or from beds of dense vegetation or in tandem (with leads connected) offshore. The unit of effort is a net-day, where each frame is one net. Fyke net and tandem fyke net data were combined for length–frequency distribution analysis.

### **Mini Fyke Netting**

Mini fyke nets are small, Wisconsin-type fyke nets. Mesh size is 3-mm Ace-type nylon. The leads are 4.5 m long and 0.6 m high. The spring steel frames are 0.6 m high and 1.2 m wide with two internal wing throats. The cabs are constructed of two steel hoops (0.6 m in diameter) with one throat. These nets are fished singly from shoreline or from beds of dense vegetation or in tandem (with leads connected) offshore. The unit of effort is a net-day, where each frame is one net.

## Trawling

Trawling is conducted only at permanently fixed sampling sites in tailwater zones and unstructured channel borders. The LTRMP trawls collect mainly small, bottom-dwelling fish. The trawls are two-seam, 4.8-m slingshot balloon trawls (TRL16BC, Memphis Net and Twine Co., Inc., or the equivalent). The body of the trawl is made of No. 9 nylon with stretch mesh 18 mm in diameter. The cod end is made of No. 18 nylon with stretch mesh 18 mm in diameter. The cod end contains a 1.8-m liner consisting of 3-mm Ace-type nylon mesh. Floats are spaced every 0.91 m along the headrope, and a 4.8-mm steel chain is tied to the footrope. The trawl is equipped with 37-cm-high by 75-cm-long iron "V" doors (otter boards). These trawls are dragged downriver by small, flat-bottomed boats. Trawl speed is barely faster than ambient current speed. The standard unit of trawl effort is a haul. A minimum of six hauls is collected in main or side channel sites and four hauls at tailwater sites.

## Gill Netting

In 1993, gill nets became an optional experimental sampling gear. This option was included to improve monitoring capabilities for some large riverine species. Gill nets are 91.44 m long and consist of four, 22.86-m panels of monofilament mesh. The panels are 2.44 m deep. Each panel consists of different mesh of 10.2-, 20.3-, and 25.4-cm stretch measure. The 10.2- and 15.2-cm mesh are woven from No. 8 (9.07-kg [20-pound] test) transparent nylon monofilament. The 25.4-cm mesh is woven from No. 12 (13.61-kg [30-pound] test) transparent nylon monofilament. The top line is floating foam-core rope and the bottom line is 29.50-kg lead-core rope. Gill nets are set either perpendicularly (preferred) or parallel (in high-flow conditions) to the shoreline. The standard unit of gill netting effort is the net-day, where a day is 24 h.

## Statistical Methods

The LTRMP uses mean catch-per-unit-effort  $C/f$  as an index of abundance, as is conventional practice (Ricker 1975). The units of effort are specific to particular gears. For electrofishing and seining, effort is a constant, but for other gears it is somewhat variable. For example, although the effort goal for fyke nets is 1 day (Gutreuter et al. 1995), actual effort may vary between 20 and 30 h. Catch and effort are recorded for each species from individual samples (deployments of particular gears) at unique combinations of time and place. Whenever a species is not caught in a sample, the catch for that species in that sample is zero. Although these zero catches are not recorded, they are reconstructed for analyses.

The estimates of pooled reachwide mean  $C/f$  were obtained from the conventional design-based estimator for stratified random samples (Cochran 1977). For an arbitrary random variable denoted  $y$  (for this report  $y$  represents  $C/f$ ), the pooled mean, denoted  $\bar{y}_{st}$  ( $st$  represents stratified) is given by

$$\bar{y}_{st} = \frac{1}{N} \sum_{h=1}^L N_h \bar{y}_h \quad (1)$$

where  $N_h$  is the number of sampling units within stratum  $h$ ,  $N = \sum_{h=1}^L N_h$ , and  $\bar{y}_h$  denotes the estimator of the simple mean of  $y$  for stratum  $h$ . The estimator of the variance of  $\bar{y}_{st}$  is

$$s^2(\bar{y}_{st}) = \frac{1}{N^2} \sum_{h=1}^L N_h (N_h - n_h) \left( \frac{s_h^2}{n_h} \right) \quad (2)$$

where

$$s_h^2 = \frac{\sum_{i=1}^{n_h} (y_{hi} - \bar{y}_h)^2}{n_h - 1}$$

is the usual estimator of the variance of  $y_h$  and  $n_h$  is the number of samples taken in stratum  $h$  (Cochran 1977). The standard error of  $\bar{y}_{st}$  is therefore  $s(\bar{y}_{st})$ . For LTRMP fish monitoring, the sampling units are 50-m<sup>2</sup> sampling grids.

In this report,  $C/f$  statistics are reported separately for the limited, fixed-site sampling and the primary stratified random sampling. Equation (1) is used to estimate means of data obtained from fixed-site sampling to maintain computational consistency. The pooled means from fixed-site sampling are not guaranteed unbiased because there is no assurance that the fixed sites were unbiased within the stratum. Equation (1) is also used to obtain estimates of overall mean catch-per-unit-effort from stratified random sampling. In random samples, equation (1) yields unbiased estimates of the pooled means regardless of the probability distribution of  $y$  (Cochran 1977).

Length distribution analysis was performed for 13 selected fish species (gear used): gizzard shad (electrofishing), common carp (electrofishing), smallmouth buffalo (electrofishing; large and small hoop netting), channel catfish (electrofishing; large and small hoop netting), northern pike (electrofishing; fyke and tandem fyke netting), white bass (electrofishing), bluegill (electrofishing; fyke and tandem fyke netting), largemouth bass (electrofishing), white crappie (electrofishing; fyke and tandem fyke netting), black crappie (electrofishing; fyke and tandem fyke netting), sauger (electrofishing), walleye (electrofishing), and freshwater drum (electrofishing; fyke and tandem fyke netting). The data are illustrated in the form of histograms within the following chapters. In some instances, meaningful biological interpretation of these distributions may be limited by small sample size or size selectivity of the gear (Anderson and Neumann 1996). Some fish histograms with small sample sizes (<100) are included in this report because of local interest, while others were omitted (reach dependent).

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# **Chapter 1. Pool 4, Upper Mississippi River**

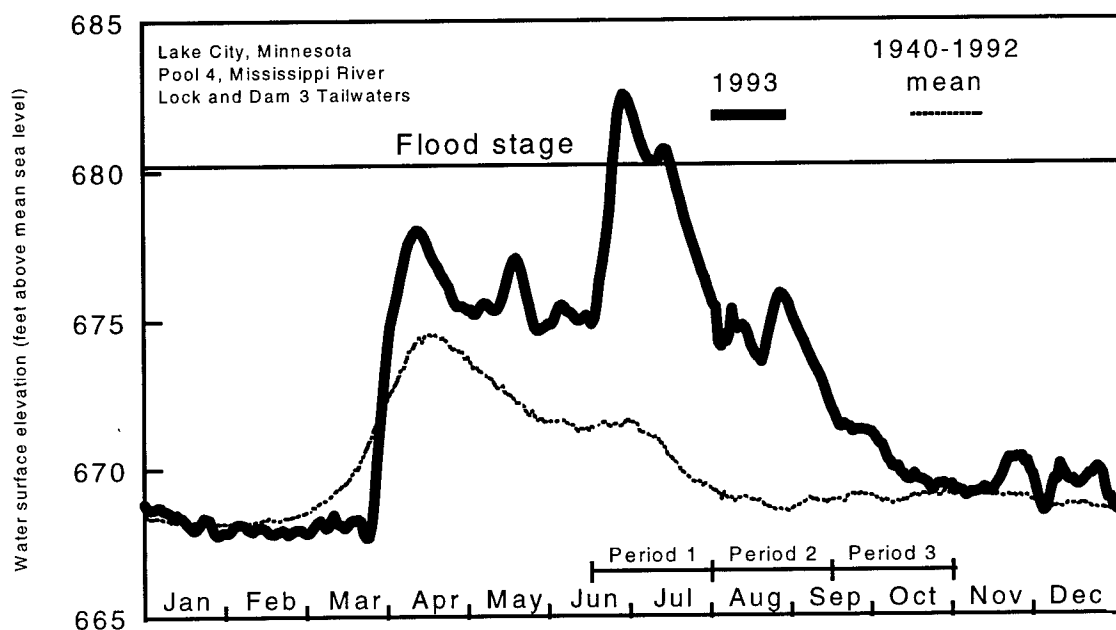
by

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## Hydrograph

Water levels in the Lock and Dam 3 tailwaters exceeded the 1940 to 1992 mean elevations throughout most of the year (Figure 1.1). Sampling was suspended during the first period at the peak of the 1993 flood. Wing dams were not sampled during periods 1 or 2 because of the high flows.



**Figure 1.1.** Daily water surface elevation from Lock and Dam 3 for Pool 4, Upper Mississippi River, during 1993 and mean elevation since 1940. The U.S. Army Corps of Engineers discharge data were obtained from the Environmental Management Technical Center (Wlosinski et al. 1995).

## Summary of Sampling Effort

In 1993, we completed 387 collections at randomly selected and fixed sites (Table 1.1). Fixed-site samples comprised 36 collections in the TWZ and 9 collections in the MCBW.

## Total Catch by Gear

We collected 12,833 fish representing 73 species and three hybrids in 1993 (Table 1.2). Historically, 99 species have been documented in Pool 4 (Pitlo et al., 1995). In 1993, the most numerically abundant species (and total catches) were the emerald shiner (3,403), bluegill (1,432), common carp (1,180), gizzard shad (723), and spotfin shiner (718). Total catches by gear were by day electrofishing, 5,059; night electrofishing, 1,118; fyke net, 544; tandem fyke net, 1,180; mini fyke, 1,109; tandem mini fyke, 276; seine, 2,712; small hoop net, 158; large hoop net, 438; gill net, 288; and trawl, 1.

## Random Sampling, Mean *C/f* by Gear and Stratum

### *Day Electrofishing*

We collected 55 species by day electrofishing (Table 1.2). Species with the highest poolwide mean catch-per-unit-effort (*C/f*) in day electrofishing collections (Table 1.3.1) were the emerald shiner (97/h = 4 × 24.3/15-min run), gizzard shad (40/h), and common carp (26/h). The emerald shiner was the most commonly caught species by electrofishing in three strata: BWCS (138/h), MCBU (239/h), and SCB (93/h). The gizzard shad predominated in the BWCO (23/h) and in the MCBW; the highest *C/f* was for the shorthead redhorse (40/h). Four species taken by electrofishing were not collected by any other gear. These were the chestnut lamprey, silver lamprey, orangespotted sunfish, and crystal darter.

### *Fyke Net*

We collected 30 species in fyke nets in the BWCS (Table 1.2), including the only brown bullhead collected in 1993. The *C/f* in fyke nets (Table 1.3.2) were highest for the black crappie (6/net-day) and the bluegill and common carp (3 each/net-day).

### *Tandem Fyke Net*

Thirty-one species were collected in tandem fyke nets in the BWCO (Table 1.2). The most commonly caught species (Table 1.3.3) were the black crappie (7/net-day), common carp (4/net-day), and bluegill (3/net-day). The yellow bullhead was collected solely by this gear in 1993.

### *Mini Fyke Net*

We collected 36 species in mini fyke nets (Table 1.2). Poolwide *C/fs* (Table 1.3.4) were highest for the bluegill (16/net-day) and pugnose minnow (2/net-day). The bluegill was the most common species in collections from the BWCS (54/net-day) and the SCB (4/net-day). The spotfin shiner was the most abundant species in mini fyke net collections from the MCBU (2/net-day). One species, the slenderhead darter, was collected solely by this gear.

### *Tandem Mini Fyke Net*

We collected 31 species in tandem mini fyke nets in the BWCO (Table 1.2). The most commonly caught species (Table 1.3.5) were the tadpole madtom (1/net-day) and the emerald shiner (0.7/net-day). Three species were collected solely in tandem mini fyke nets in 1993—the stonecat, central mudminnow, and pirate perch.

### *Small Hoop Net*

We collected 13 species in small hoop nets (Table 1.2). The highest poolwide *C/fs* (Table 1.3.6) were for the common carp (0.7/net-day) and channel catfish (0.5/net-day).



### *Large Hoop Net*

We collected 18 species in large hoop nets (Table 1.2). Poolwide, the most commonly caught species (Table 1.3.7) were the common carp (2/net-day) and channel catfish (1/net-day). The common carp was the most frequently caught species in the BWCO (3/net-day). In the SCB, the highest *C/f* was for the white bass (1/net-day). The smallmouth buffalo had the highest *C/f* in the MCBU (0.8/net-day). The sole highfin carpsucker collected in 1993 was caught in a large hoop net.

### *Seine*

We collected 40 species in the seine (Table 1.2), including the sole specimens of the banded darter and speckled chub taken during 1993. Poolwide *C/fs* in the seine (Table 1.3.8) were highest for the emerald shiner (28/haul), spotfin shiner (13/haul), and river shiner (6/haul). The emerald shiner was the most frequently collected species in the SCB (37/haul); in the MCBU, the spotfin shiner had the highest catch rate (19/haul).

### *Gill Net*

We collected 25 species in gill nets (Table 1.2) including the only specimens of the goldeye and blue sucker caught in 1993. The highest poolwide *C/fs* (Table 1.3.9) were for the common carp (3/net-day), smallmouth buffalo (1/net-day), and freshwater drum (1/net-day). The common carp had the highest *C/f* in the BWCO (4/net-day), MCBU (2/net-day), and SCB (2/net-day) strata.

## **Fixed Sampling, Mean *C/f* by Gear and Stratum**

### *Night Electrofishing*

The *C/f* for 36 species collected by night electrofishing at fixed sites in the TWZ are reported in Table 1.4.1. The highest *C/fs* were for the common carp (67/h), freshwater drum (61/h), and sauger (46/h).

### *Fyke Net*

The *C/f* for 10 species collected in fyke nets at fixed sites are reported in Table 1.4.2. The highest *C/fs* were for the freshwater drum (11/net-day) and white bass (7/net-day).

### *Mini Fyke Net*

The *C/f* for 14 species collected in mini fyke nets at fixed sites in the TWZ are reported in Table 1.4.3. Mini fyke net *C/fs* were highest for the emerald shiner and gizzard shad (4 each/net-day) and the spotfin shiner (1/net-day).

### *Small and Large Hoop Nets*

The common carp was the most frequently collected species in small hoop nets at fixed sites (Table 1.4.4) in the TWZ (1/net-day) stratum. The C/fs in large hoop nets (Table 1.4.5) in the TWZ were highest for the common carp (0.4/net-day) and freshwater drum (0.4 each/net-day).

### *Trawl*

Channel catfish was the only species collected by trawling in the TWZ stratum (Table 1.4.6).

## **Length Distributions of Selected Species**

### *Gizzard Shad*

The modal length of 680 gizzard shad collected by electrofishing was 4 cm, and the maximum length was 48 cm (Figure 1.2). The majority of the gizzard shad in this sample were less than 14 cm long.

### *Common Carp*

The modal length of 690 common carp collected by electrofishing was 46 cm (Figure 1.3). The maximum length was 80 cm, and the minimum length was 24 cm.

### *Smallmouth Buffalo*

The modal length of 27 smallmouth buffalo collected by electrofishing was 50 cm (Figure 1.4). The 66 smallmouth buffalo collected in hoop nets ranged in length from 40 to 60 cm, and the modal length was 46 cm (Figure 1.5).

### *Channel Catfish*

The length distribution of 20 channel catfish collected by electrofishing was bimodal, with peaks at 44 and 48 cm (Figure 1.6). The 126 channel catfish collected in hoop nets ranged in length from 18 to 80 cm, with modes at 36 and 44 cm (Figure 1.7).

### *Northern Pike*

The lengths of 30 northern pike collected by electrofishing ranged from 8 to 96 cm (Figure 1.8). Lengths of 23 northern pike collected in fyke nets ranged from 20 to 88 cm (Figure 1.9).

### *White Bass*

The length distribution of 159 white bass collected by electrofishing is presented in Figure 1.10. Lengths ranged from 4 to 38 cm, with modes at 18 and 34 cm.

### *Bluegill*

The modal length of 382 bluegills collected by electrofishing was 2 cm, and the maximum length was 22 cm (Figure 1.11). The 219 bluegills collected in fyke nets ranged in length from 4 to 24 cm, and the modal length was 16 cm (Figure 1.12).

### *Largemouth Bass*

The length distribution of 80 largemouth bass collected by electrofishing is presented in Figure 1.13. Lengths ranged from 2 to 48 cm. The modal length was 8 cm.

### *Black Crappie*

The lengths of 446 black crappies collected in fyke nets ranged from 6 to 30 cm (Figure 1.14). The modal length was 12 cm.

### *Sauger*

The length distribution of 197 saugers collected by electrofishing is presented in Figure 1.15. Lengths of saugers ranged from 10 to 48 cm, and the modal length was 18 cm.

### *Walleye*

The length distribution of 102 walleyes collected by electrofishing is presented in Figure 1.16. Individuals ranged from 8 to 68 cm in length, and the modal length was 38 cm.

### *Freshwater Drum*

Freshwater drum collected by electrofishing ranged from 4 to 54 cm in length, and the modal length was 26 cm (Figure 1.17). Freshwater drum collected in fyke nets were 10 to 46 cm long, and the modal length was 32 cm (Figure 1.18).

Table 1.1. Allocation of fish sampling effort among strata by the Long Term Resource Monitoring Program in Pool 4 of the Mississippi River during 1993. Table entries are numbers of successfully completed standardized monitoring collections.

Table page: 1

Sampling period = 1: June 15 - July 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	TRI	TWZ	TOTAL
Day electrofishing	6	7	4	6						23
Fyke net	5									5
Gill net		4	2							6
Large hoop net		4	6	6						16
Small hoop net		4	6	6						16
Mini fyke net	5		4	3						12
Night electrofishing									4	4
Seine			8	2						10
Tandem fyke net		7								7
Tandem mini fyke net		8								8
SUBTOTAL	16	34	30	23	0	0	0	0	4	107

Sampling period = 2: August 1 - September 14

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	TRI	TWZ	TOTAL
Day electrofishing	5	7	4	6						22
Fyke net	6								2	8
Gill net		4	4	4						12
Large hoop net		3	7	7					2	19
Small hoop net		3	8	6					2	19
Mini fyke net	5	1	6	4					2	18
Night electrofishing									4	4
Seine			10	4						14
Trawling									4	4
Tandem fyke net		8								8
Tandem mini fyke net		8								8
SUBTOTAL	16	34	39	31	0	0	0	0	16	136

Sampling period = 3: September 15 - October 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	TRI	TWZ	TOTAL
Day electrofishing	4	10	4	6	2					26
Fyke net	6				1				2	9
Gill net		5	4	3						12
Large hoop net		4	6	4	3				2	19
Small hoop net		4	5	6	3				2	20
Mini fyke net	4		7	3	2				2	18
Night electrofishing									4	4
Seine			12	4						16
Trawling									4	4
Tandem fyke net		8								8
Tandem mini fyke net		8								8
SUBTOTAL	14	39	38	26	11	0	0	0	16	144
	46	107	107	80	11	0	0	0	36	387

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 1.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1993 in Pool 4 of the Mississippi River. See Table 1.1 for the list of sampling gears actually deployed in this study reach.

Species	Common name	Scientific name	D	N	F	X	M	Y	S	HS	HL	G	T	TOTAL
1	Chestnut lamprey	Ichthyomyzon castaneus	2	1	-	-	-	-	-	-	-	-	-	3
2	Silver lamprey	Ichthyomyzon unicuspis	1	-	-	-	-	-	-	-	-	-	-	1
3	Shovelnose sturgeon	Scaphirhynchus platyrhynchus	-	-	-	-	-	-	-	-	-	1	-	1
4	Longnose gar	Lepisosteus osseus	6	1	3	4	-	1	1	-	2	2	-	20
5	Shortnose gar	Lepisosteus platostomus	-	2	2	2	-	-	-	-	1	-	-	7
6	Bowfin	Amia calva	24	-	24	13	6	2	-	-	-	5	-	74
7	Goldeye	Hiodon alosoides	-	-	-	-	-	-	-	-	-	1	-	1
8	Mooneye	Hiodon tergisus	5	2	-	-	-	-	-	-	1	4	-	12
9	American eel	Anguilla rostrata	-	-	1	1	-	-	-	-	-	-	-	2
10	Skipjack herring	Alosa chrysochloris	1	-	-	-	1	-	-	-	-	-	-	2
11	Gizzard shad	Dorosoma cepedianum	633	47	4	3	17	-	7	-	-	12	-	723
12	Spotfin shiner	Cyprinella spiloptera	173	7	-	-	94	-	444	-	-	-	-	718
13	Common carp	Cyprinus carpio	505	185	56	159	12	3	2	53	117	88	-	1180
14	Speckled chub	Macrhybopsis aestivalis	-	-	-	-	-	-	2	-	-	-	-	2
15	Silver chub	Macrhybopsis storeriana	5	1	-	2	3	1	-	4	-	-	-	16
16	Golden shiner	Notemigonus crysoleucas	39	-	1	1	4	1	13	-	-	-	-	59
17	Emerald shiner	Notropis atherinoides	1924	136	-	-	48	30	1265	-	-	-	-	3403
18	River shiner	Notropis bleinnius	93	5	-	-	-	-	140	-	-	-	-	238
19	Spottail shiner	Notropis hudsonius	28	-	-	-	1	20	4	-	-	-	-	53
20	Sand shiner	Notropis stramineus	1	-	-	-	4	1	97	-	-	-	-	103
21	Weed shiner	Notropis texanus	1	-	-	-	13	1	17	-	-	-	-	32
22	Mimic shiner	Notropis volucellus	20	5	-	-	4	5	49	-	-	-	-	83
23	Pugnose minnow	Opsopoeodus emiliae	11	-	-	-	84	11	18	-	-	-	-	124
24	Bluntnose minnow	Pimephales notatus	-	-	-	-	-	-	1	-	-	-	-	1
25	Bullhead minnow	Pimephales vigilax	6	6	-	-	5	15	125	-	-	-	-	157
26	Unidentified minnow	Cyprinid sp.	6	-	-	-	2	2	6	-	-	-	-	16
27	River carpsucker	Carpoides carpio	10	4	-	6	-	-	-	-	-	1	-	21
28	Quillback	Carpoides cyprinus	20	-	-	-	1	-	11	-	-	3	-	35
29	Highfin carpsucker	Carpoides velifer	-	-	-	-	-	-	-	-	1	-	-	1
30	White sucker	Catostomus commersoni	9	1	6	6	-	-	-	-	-	1	-	23
31	Blue sucker	Cycleptus elongatus	-	-	-	-	-	-	-	-	-	1	-	1
32	Smallmouth buffalo	Ictiobus bubalus	25	2	10	12	-	-	-	-	66	40	-	155
33	Bighmouth buffalo	Ictiobus cyprinellus	-	3	-	1	-	-	-	-	-	1	-	5
34	Spotted sucker	Minytrema melanops	70	-	8	8	-	-	-	-	-	2	-	88
35	Silver redhorse	Moxostoma anisurum	118	14	30	70	8	1	3	-	5	18	-	267
36	River redhorse	Moxostoma carinatum	14	-	-	-	-	-	-	-	-	1	-	15
37	Black redhorse	Moxostoma duquesnei	1	-	-	-	-	-	-	-	-	-	-	1
38	Golden redhorse	Moxostoma erythrurum	62	24	3	3	-	-	-	1	-	1	-	94
39	Shorthead redhorse	Moxostoma macrolepidotum	128	15	11	19	1	-	2	23	11	3	-	213

Gears: D - Day electrofishing

N - Night electrofishing

S - Seining

HS - Small hoop netting

HL - Large hoop netting

F - Fyke netting

X - Tandem fyke netting

G - Gill netting

M - Mini fyke netting

Y - Tandem mini fyke netting

T - Trawling (4.8-m bottom trawl)

Table 1.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1993 in Pool 4 of the Mississippi River. See Table 1.1 for the list of sampling gears actually deployed in this study reach.

Table page: 2

Species	Common name	Scientific name	D	N	F	X	M	Y	S	HS	HL	G	T	TOTAL
40	Unidentified redhorse	Moxostoma sp.	-	-	-	-	-	-	157	-	-	-	-	157
41	Unidentified sucker	Catostomid sp.	-	-	-	-	-	5	-	-	-	-	-	5
42	Black bullhead	Ameiurus melas	-	-	-	1	-	-	-	-	-	-	-	1
43	Yellow bullhead	Ameiurus natalis	-	-	3	-	-	1	1	-	-	-	-	5
44	Brown bullhead	Ameiurus nebulosus	-	-	2	-	-	-	-	-	-	-	-	2
45	Channel catfish	Ictalurus punctatus	16	4	3	4	-	4	1	35	91	29	1	188
46	Stoneroller	Noturus flavus	-	-	-	-	-	-	-	-	-	-	-	1
47	Tadpole darter	Noturus gyrinus	2	-	-	-	3	49	-	-	-	-	-	54
48	Flathead catfish	Pylodictis olivaris	4	3	2	5	-	1	-	2	8	2	-	27
49	Northern pike	Esox lucius	22	8	12	12	14	14	37	-	4	10	-	133
50	Central mudminnow	Umbra limi	-	-	-	-	-	3	-	-	-	-	-	3
51	Trout-perch	Percopsis omiscomaycus	7	-	-	-	5	13	6	-	-	-	-	31
52	Pirate perch	Aphredoderus sayanus	-	-	-	-	-	1	-	-	-	-	-	1
53	Burbot	Lota lota	1	4	-	-	1	-	-	1	-	-	-	7
54	Brook silverside	Labidesthes sicculus	11	5	-	-	1	-	4	-	-	-	-	21
55	White bass	Morone chrysops	99	60	62	74	5	2	9	-	45	22	-	378
56	Rock bass	Ambloplites rupestris	37	14	9	45	7	15	15	16	2	-	-	160
57	Green sunfish	Lepomis cyanellus	1	11	-	1	-	-	-	-	-	-	-	13
58	Pumpkinseed	Lepomis gibbosus	7	-	1	9	-	1	2	-	-	-	-	20
59	Orangespotted sunfish	Lepomis humilis	1	-	-	-	-	-	-	-	-	-	-	1
60	Bluegill	Lepomis macrochirus	299	83	57	162	711	14	86	12	8	-	-	1432
61	Green sunfish x pumpkinseed	L. cyanellus x L. gibbosus	-	-	1	-	-	-	-	-	-	-	-	1
62	Green sunfish x bluegill	L. cyanellus x L. macrochirus	-	-	1	-	1	-	1	-	-	-	-	3
63	Pumpkinseed x bluegill	L. gibbosus x L. macrochirus	1	-	-	-	-	-	-	-	-	-	-	1
64	Smallmouth bass	Micropterus dolomieu	72	45	2	-	1	-	1	-	-	1	-	122
65	Largemouth bass	Micropterus salmoides	58	22	3	-	4	1	-	-	-	-	-	88
66	White crappie	Pomoxis annularis	4	10	5	5	6	-	1	-	1	-	-	32
67	Black crappie	Pomoxis nigromaculatus	41	22	104	342	11	10	16	5	23	-	-	574
68	Unidentified sunfish	Centrarchid sp.	-	-	-	-	1	-	-	-	-	-	-	1
69	Crystal darter	Ammocrypta asprella	1	-	-	-	-	-	-	-	-	-	-	1
70	Western sand darter	Ammocrypta clara	1	-	-	-	-	-	39	-	-	-	-	40
71	Mud darter	Etheostoma asprigene	3	-	-	-	1	6	6	-	-	-	-	16
72	Johnny darter	Etheostoma zonale	11	-	-	-	4	11	96	-	-	-	-	122
73	Banded darter	Etheostoma nigrum	-	-	-	-	-	-	1	-	-	-	-	1
74	Yellow perch	Perca flavescens	154	-	30	43	2	3	3	-	-	-	-	235
75	Logperch	Percina caprodes	12	5	-	-	1	2	2	-	-	-	-	22
76	Slenderhead darter	Percina phoxocephala	-	-	-	-	3	-	-	-	-	-	-	3
77	River darter	Percina shumardi	-	-	-	-	2	-	2	-	-	-	-	4
78	Sauger	Stizostedion canadense	58	139	2	8	-	1	1	1	-	-	-	210

Gears: D - Day electrofishing  
N - Night electrofishing  
F - Fyke netting  
X - Tandem fyke netting  
M - Mini fyke netting  
Y - Tandem mini fyke netting

S - Seining  
HS - Small hoop netting  
HL - Large hoop netting  
G - Gill netting  
T - Trawling (4.8-m bottom trawl)

Table 1.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1993 in Pool 4 of the Mississippi River. See Table 1.1 for the list of sampling gears actually deployed in this study reach.

Table page: 3

Species	Common name	Scientific name	D	N	F	X	M	Y	S	HS	HL	G	T	TOTAL
79	Walleye	Stizostedion vitreum	52	50	3	4	-	-	1	1	1	8	-	120
80	Unidentified Stizostedion	Stizostedion sp.	-	-	-	-	-	-	15	-	-	-	-	15
81	Freshwater drum	Aplodinotus grunniens	143	172	83	155	17	24	2	4	51	31	-	682
			=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
			5059	1118	544	1180	1109	276	2712	158	438	288	1	12883

Gears: D - Day electrofishing  
N - Night electrofishing  
F - Fyke netting  
X - Tandem fyke netting  
M - Mini fyke netting  
Y - Tandem mini fyke netting  
S - Seining  
HS - Small hoop netting  
HL - Large hoop netting  
G - Gill netting  
T - Trawling (4.8-m bottom trawl)

Table 1.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by day electrofishing in Pool 4 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 1.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Channel catfish	0.21 (0.06)	0.25 (0.11)	0.13 (0.09)			0.33 (0.14)		0.17 (0.17)		
Tadpole madtom	0.04 (0.02)		0.07 (0.07)					0.08 (0.08)		
Flathead catfish	0.04 (0.03)		0.07 (0.07)			0.16 (0.11)				
Northern pike	0.33 (0.08)	0.12 (0.09)	0.40 (0.16)			0.22 (0.10)	0.50 (0.50)	0.71 (0.29)		
Trout-perch	0.08 (0.04)	0.13 (0.09)				0.22 (0.15)				
Burbot	0.01 (0.01)					0.06 (0.06)				
Brook silverside	0.20 (0.17)		0.73 (0.61)							
White bass	1.19 (0.26)	0.42 (0.18)	0.80 (0.34)			3.20 (1.06)	0.50 (0.50)	1.50 (0.76)		
Rock bass	0.52 (0.14)	0.17 (0.10)	0.80 (0.38)			0.64 (0.27)	0.50 (0.50)	0.67 (0.33)		
Green sunfish	0.01 (0.01)					0.06 (0.06)				
Pumpkinseed	0.12 (0.07)	0.04 (0.04)	0.40 (0.24)							
Orangespotted sunfish	0.02 (0.02)		0.07 (0.07)							
Bluegill	5.37 (3.52)	0.33 (0.15)	17.73 (12.85)			0.22 (0.13)		1.75 (0.80)		
Pumpkinseed x bluegill	0.01 (0.01)	0.04 (0.04)								
Smallmouth bass	0.76 (0.19)	0.08 (0.06)	0.87 (0.52)			2.15 (0.61)	5.00 (5.00)	0.67 (0.33)		
Largemouth bass	0.99 (0.28)	0.33 (0.15)	2.60 (0.99)			0.21 (0.12)		0.62 (0.21)		
White crappie	0.07 (0.06)		0.27 (0.21)							
Black crappie	0.69 (0.16)	0.28 (0.10)	1.67 (0.51)			0.22 (0.17)		0.46 (0.35)		
Crystal darter	0.01 (0.01)					0.06 (0.06)				
Western sand darter	0.01 (0.01)					0.06 (0.06)				
Mud darter	0.05 (0.03)		0.13 (0.09)					0.08 (0.08)		
Johnny darter	0.17 (0.08)		0.20 (0.14)			0.17 (0.17)		0.42 (0.29)		
Yellow perch	2.50 (0.72)	3.29 (1.57)	4.13 (1.60)			0.26 (0.19)		0.71 (0.32)		
Logperch	0.17 (0.07)	0.13 (0.09)	0.27 (0.21)			0.22 (0.10)		0.08 (0.08)		
Sauger	0.77 (0.18)	0.58 (0.19)	0.47 (0.24)			1.31 (0.79)		1.08 (0.45)		
Walleye	0.76 (0.24)	0.41 (0.15)	1.27 (0.80)			0.66 (0.31)	1.00 (1.00)	0.79 (0.28)		
Freshwater drum	2.10 (0.33)	1.16 (0.29)	2.53 (0.53)			2.52 (0.85)		2.87 (1.19)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



Table 1.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by day electrofishing in Pool 4 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 1.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Channel catfish	0.21 (0.06)	0.25 (0.11)	0.13 (0.09)			0.33 (0.14)		0.17 (0.17)		
Tadpole madtom	0.04 (0.02)		0.07 (0.07)					0.08 (0.08)		
Flathead catfish	0.04 (0.03)		0.07 (0.07)			0.16 (0.11)				
Northern pike	0.33 (0.08)	0.12 (0.09)	0.40 (0.16)			0.22 (0.10)	0.50 (0.50)	0.71 (0.29)		
Trout-perch	0.08 (0.04)	0.13 (0.09)				0.22 (0.15)				
Burbot	0.01 (0.01)					0.06 (0.06)				
Brook silverside	0.20 (0.17)		0.73 (0.61)							
White bass	1.19 (0.26)	0.42 (0.18)	0.80 (0.34)			3.20 (1.06)	0.50 (0.50)	1.50 (0.76)		
Rock bass	0.52 (0.14)	0.17 (0.10)	0.80 (0.38)			0.64 (0.27)	0.50 (0.50)	0.67 (0.33)		
Green sunfish	0.01 (0.01)					0.06 (0.06)				
Pumpkinseed	0.12 (0.07)	0.04 (0.04)	0.40 (0.24)							
Orangespotted sunfish	0.02 (0.02)		0.07 (0.07)							
Bluegill	5.37 (3.52)	0.33 (0.15)	17.73 (12.85)			0.22 (0.13)		1.75 (0.80)		
Pumpkinseed x bluegill	0.01 (0.01)	0.04 (0.04)								
Smallmouth bass	0.76 (0.19)	0.08 (0.06)	0.87 (0.52)			2.15 (0.61)	5.00 (5.00)	0.67 (0.33)		
Largemouth bass	0.99 (0.28)	0.33 (0.15)	2.60 (0.99)			0.21 (0.12)		0.62 (0.21)		
White crappie	0.07 (0.06)		0.27 (0.21)							
Black crappie	0.69 (0.16)	0.28 (0.10)	1.67 (0.51)			0.22 (0.17)		0.46 (0.35)		
Crystal darter	0.01 (0.01)					0.06 (0.06)				
Western sand darter	0.01 (0.01)					0.06 (0.06)				
Mud darter	0.05 (0.03)		0.13 (0.09)					0.08 (0.08)		
Johnny darter	0.17 (0.08)		0.20 (0.14)			0.17 (0.17)		0.42 (0.29)		
Yellow perch	2.50 (0.72)	3.29 (1.57)	4.13 (1.60)			0.26 (0.19)		0.71 (0.32)		
Logperch	0.17 (0.07)	0.13 (0.09)	0.27 (0.21)			0.22 (0.10)		0.08 (0.08)		
Sauger	0.77 (0.18)	0.58 (0.19)	0.47 (0.24)			1.31 (0.79)		1.08 (0.45)		
Walleye	0.76 (0.24)	0.41 (0.15)	1.27 (0.80)			0.66 (0.31)	1.00 (1.00)	0.79 (0.28)		
Freshwater drum	2.10 (0.33)	1.16 (0.29)	2.53 (0.53)			2.52 (0.85)		2.87 (1.19)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
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Table 1.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by fyke netting in Pool 4 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 1.1). See text for definitions of catch-per-unit-effort and standard error..

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar	0.19 (0.10)		0.19 (0.10)							
Shortnose gar	0.13 (0.09)		0.13 (0.09)							
Bowfin	1.52 (0.57)		1.52 (0.57)							
Gizzard shad	0.25 (0.25)		0.25 (0.25)							
Common carp	3.10 (1.05)		3.10 (1.06)							
Golden shiner	0.06 (0.06)		0.06 (0.06)							
White sucker	0.37 (0.37)		0.37 (0.37)							
Smallmouth buffalo	0.66 (0.42)		0.66 (0.42)							
Spotted sucker	0.48 (0.20)		0.48 (0.20)							
Silver redhorse	1.81 (0.56)		1.81 (0.56)							
Golden redhorse	0.13 (0.09)		0.13 (0.09)							
Shorthead redhorse	0.57 (0.25)		0.57 (0.25)							
Yellow bullhead	0.18 (0.10)		0.18 (0.10)							
Brown bullhead	0.13 (0.09)		0.13 (0.09)							
Channel catfish	0.13 (0.09)		0.13 (0.09)							
Northern pike	0.77 (0.27)		0.77 (0.27)							
White bass	2.20 (1.37)		2.20 (1.38)							
Rock bass	0.51 (0.18)		0.51 (0.18)							
Pumpkinseed	0.05 (0.05)		0.05 (0.05)							
Bluegill	3.46 (1.04)		3.46 (1.04)							
Green x pumpkinseed sunfish	0.06 (0.06)		0.06 (0.06)							
Green sunfish x bluegill	0.06 (0.06)		0.06 (0.06)							
Largemouth bass	0.19 (0.13)		0.19 (0.13)							
White crappie	0.32 (0.20)		0.32 (0.20)							
Black crappie	6.15 (2.04)		6.15 (2.04)							
Yellow perch	1.83 (1.54)		1.83 (1.54)							
Walleye	0.13 (0.09)		0.13 (0.09)							
Freshwater drum	2.70 (1.20)		2.70 (1.21)							

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
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 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 1.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by tandem fyke netting in Pool 4 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 1.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar	0.09 (0.07)	0.09 (0.07)								
Shortnose gar	0.05 (0.05)	0.05 (0.05)								
Bowfin	0.29 (0.19)	0.29 (0.19)								
American eel	0.02 (0.02)	0.02 (0.02)								
Gizzard shad	0.07 (0.05)	0.07 (0.05)								
Common carp	3.87 (2.38)	3.87 (2.39)								
Silver chub	0.04 (0.04)	0.04 (0.04)								
Golden shiner	0.02 (0.02)	0.02 (0.02)								
River carpsucker	0.13 (0.07)	0.13 (0.07)								
White sucker	0.13 (0.07)	0.13 (0.07)								
Smallmouth buffalo	0.25 (0.15)	0.25 (0.15)								
Bigmouth buffalo	0.03 (0.03)	0.03 (0.03)								
Spotted sucker	0.17 (0.09)	0.17 (0.09)								
Silver redhorse	1.54 (0.38)	1.54 (0.38)								
Golden redhorse	0.06 (0.04)	0.06 (0.04)								
Shorthead redhorse	0.42 (0.16)	0.42 (0.16)								
Black bullhead	0.02 (0.02)	0.02 (0.02)								
Channel catfish	0.09 (0.07)	0.09 (0.07)								
Flathead catfish	0.11 (0.04)	0.11 (0.04)								
Northern pike	0.26 (0.10)	0.26 (0.10)								
White bass	1.63 (0.38)	1.63 (0.38)								
Rock bass	1.01 (0.23)	1.01 (0.23)								
Green sunfish	0.02 (0.02)	0.02 (0.02)								
Pumpkinseed	0.19 (0.09)	0.19 (0.09)								
Bluegill	3.53 (1.36)	3.53 (1.37)								
White crappie	0.12 (0.07)	0.12 (0.07)								
Black crappie	7.41 (2.26)	7.41 (2.26)								
Yellow perch	0.93 (0.30)	0.93 (0.30)								
Sauger	0.18 (0.11)	0.18 (0.11)								

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 1.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by tandem fyke netting in Pool 4 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 1.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Walleye	0.09 (0.05)	0.09 (0.05)								
Freshwater drum	3.41 (1.04)	3.41 (1.04)								

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 1.3.4. Mean catch-per-unit-effort and (standard error) for fishes collected by mini fyke netting in Pool 4 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 1.1). See text for definitions of catch-per-unit-effort and standard error.

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Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Bowfin	0.12 (0.10)		0.45 (0.37)							
Gizzard shad	0.04 (0.03)		0.08 (0.08)					0.07 (0.07)		
Spotfin shiner	1.18 (0.73)		0.07 (0.07)			2.01 (1.88)		4.12 (3.25)		
Common carp	0.22 (0.09)		0.63 (0.32)			0.22 (0.14)		0.07 (0.07)		
Silver chub	0.01 (0.01)							0.06 (0.06)		
Golden shiner	0.04 (0.03)		0.08 (0.08)					0.11 (0.08)		
Emerald shiner	0.60 (0.38)		1.43 (1.35)			0.42 (0.31)		0.69 (0.44)		
Spottail shiner	0.02 (0.02)		0.08 (0.08)							
Sand shiner	0.03 (0.03)							0.16 (0.16)		
Weed shiner	0.20 (0.14)		0.24 (0.24)					0.63 (0.63)		
Mimic shiner	0.04 (0.02)					0.23 (0.16)				
Pugnose minnow	1.72 (1.25)		5.55 (4.54)			0.20 (0.14)		0.82 (0.82)		
Bullhead minnow	0.07 (0.05)		0.16 (0.16)					0.12 (0.08)		
Quillback	0.01 (0.01)							0.06 (0.06)		
Silver redhorse	0.15 (0.08)		0.40 (0.25)					0.20 (0.20)		
Shorthead redhorse	0.02 (0.02)					0.10 (0.10)				
Tadpole madtom	0.04 (0.03)		0.07 (0.07)					0.12 (0.08)		
Northern pike	0.20 (0.10)		0.22 (0.12)			0.10 (0.10)		0.60 (0.48)		
Trout-perch	0.09 (0.08)		0.08 (0.08)			0.46 (0.46)				
Burbot	0.02 (0.02)					0.10 (0.10)				
Brook silverside	0.01 (0.01)							0.07 (0.07)		
White bass	0.04 (0.03)		0.08 (0.08)			0.12 (0.12)				
Rock bass	0.10 (0.04)		0.07 (0.07)			0.29 (0.21)		0.18 (0.10)		
Bluegill	15.67 (13.49)		54.03 (49.28)			0.41 (0.31)		3.99 (3.55)		
Green sunfish x bluegill	0.01 (0.01)							0.07 (0.07)		
Largemouth bass	0.08 (0.06)		0.30 (0.22)							
White crappie	0.13 (0.09)		0.49 (0.34)							
Black crappie	0.15 (0.11)		0.56 (0.40)							
Mud darter	0.02 (0.02)		0.08 (0.08)							

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 1.3.4. Mean catch-per-unit-effort and (standard error) for fishes collected by mini fyke netting in Pool 4 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 1.1). See text for definitions of catch-per-unit-effort and standard error.

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Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Johnny darter	0.09 (0.05)		0.32 (0.19)							
Yellow perch	0.03 (0.02)					0.10 (0.10)		0.06 (0.06)		
Slenderhead darter	0.04 (0.03)					0.20 (0.20)		0.06 (0.06)		
River darter	0.02 (0.02)					0.11 (0.11)				
Freshwater drum	0.36 (0.23)		1.23 (0.83)					0.11 (0.08)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 1.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by tandem mini fyke netting in Pool 4 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 1.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar	0.02 (0.02)	0.02 (0.02)								
Bowfin	0.04 (0.03)	0.04 (0.03)								
Common carp	0.06 (0.04)	0.06 (0.04)								
Silver chub	0.02 (0.02)	0.02 (0.02)								
Golden shiner	0.02 (0.02)	0.02 (0.02)								
Emerald shiner	0.66 (0.33)	0.66 (0.33)								
Spottail shiner	0.41 (0.28)	0.41 (0.28)								
Sand shiner	0.02 (0.02)	0.02 (0.02)								
Weed shiner	0.02 (0.02)	0.02 (0.02)								
Mimic shiner	0.11 (0.09)	0.11 (0.09)								
Pugnose minnow	0.25 (0.17)	0.25 (0.17)								
Bullhead minnow	0.29 (0.22)	0.29 (0.22)								
Silver redhorse	0.02 (0.02)	0.02 (0.02)								
Yellow bullhead	0.02 (0.02)	0.02 (0.02)								
Channel catfish	0.09 (0.08)	0.09 (0.09)								
Stonecat	0.02 (0.02)	0.02 (0.02)								
Tadpole madtom	1.04 (0.53)	1.04 (0.53)								
Flathead catfish	0.02 (0.02)	0.02 (0.02)								
Northern pike	0.30 (0.17)	0.30 (0.17)								
Central mudminnow	0.06 (0.05)	0.06 (0.05)								
Trout-perch	0.29 (0.27)	0.29 (0.27)								
Pirate perch	0.02 (0.02)	0.02 (0.02)								
White bass	0.05 (0.03)	0.05 (0.03)								
Rock bass	0.29 (0.08)	0.29 (0.08)								
Pumpkinseed	0.02 (0.02)	0.02 (0.02)								
Bluegill	0.28 (0.12)	0.28 (0.12)								
Largemouth bass	0.02 (0.02)	0.02 (0.02)								
Black crappie	0.20 (0.08)	0.20 (0.08)								
Mud darter	0.13 (0.07)	0.13 (0.07)								

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMCO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 1.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by tandem mini fyke netting in Pool 4 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 1.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Johnny darter	0.23 (0.10)	0.23 (0.10)								
Yellow perch	0.06 (0.04)	0.06 (0.04)								
Logperch	0.04 (0.03)	0.04 (0.03)								
Sauger	0.02 (0.02)	0.02 (0.02)								
Freshwater drum	0.53 (0.26)	0.53 (0.26)								

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



Table 1.3.6. Mean catch-per-unit-effort and (standard error) for fishes collected by small hoop netting in Pool 4 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 1.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Common carp	0.65 (0.30)	0.98 (0.58)				0.12 (0.09)		0.50 (0.29)		
Silver chub	0.04 (0.03)	0.05 (0.05)				0.05 (0.05)		0.03 (0.03)		
Shorthead redhorse	0.15 (0.06)	0.09 (0.06)				0.34 (0.16)		0.10 (0.10)		
Channel catfish	0.52 (0.31)	0.82 (0.63)				0.34 (0.13)		0.13 (0.06)		
Flathead catfish	0.01 (0.01)							0.05 (0.04)		
Burbot	0.01 (0.01)					0.03 (0.03)				
Rock bass	0.20 (0.11)	0.27 (0.23)				0.16 (0.08)		0.11 (0.06)		
Bluegill	0.17 (0.07)	0.23 (0.13)				0.05 (0.04)		0.14 (0.10)		
Black crappie	0.10 (0.07)	0.19 (0.15)						0.03 (0.03)		
Sauger	0.01 (0.01)					0.03 (0.03)				
Walleye	0.01 (0.01)							0.03 (0.03)		
Freshwater drum	0.02 (0.02)							0.08 (0.06)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 1.3.7. Mean catch-per-unit-effort and (standard error) for fishes collected by large hoop netting in Pool 4 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 1.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar	0.01 (0.01)					0.03 (0.03)		0.03 (0.03)		
Shortnose gar	0.01 (0.01)							0.03 (0.03)		
Mooneye	0.01 (0.01)					0.03 (0.03)				
Common carp	2.00 (0.94)	3.45 (1.88)				0.15 (0.06)		0.91 (0.39)		
Highfin carpsucker	0.02 (0.02)	0.05 (0.05)								
Smallmouth buffalo	0.73 (0.28)	0.75 (0.50)				0.81 (0.46)		0.65 (0.30)		
Silver redhorse	0.03 (0.02)					0.06 (0.04)		0.05 (0.05)		
Shorthead redhorse	0.11 (0.05)	0.09 (0.06)				0.20 (0.16)		0.06 (0.04)		
Channel catfish	1.54 (1.21)	2.65 (2.45)				0.24 (0.11)		0.63 (0.26)		
Flathead catfish	0.04 (0.02)	0.04 (0.04)						0.05 (0.04)		
Northern pike	0.04 (0.03)	0.04 (0.04)				0.09 (0.09)				
White bass	0.37 (0.18)	0.09 (0.06)				0.06 (0.06)	0.24 (0.24)	1.10 (0.64)		
Rock bass	0.03 (0.02)	0.05 (0.05)				0.03 (0.03)				
Bluegill	0.09 (0.04)	0.09 (0.06)				0.06 (0.06)		0.11 (0.08)		
White crappie	0.02 (0.02)	0.04 (0.04)								
Black crappie	0.22 (0.10)	0.14 (0.10)						0.54 (0.30)		
Walleye	0.01 (0.01)							0.03 (0.03)		
Freshwater drum	0.58 (0.20)	0.66 (0.37)				0.22 (0.11)		0.73 (0.31)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 1.3.8. Mean catch-per-unit-effort and (standard error) for fishes collected by seining in Pool 4 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 1.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar	0.02 (0.02)							0.03 (0.03)		
Gizzard shad	0.21 (0.11)					0.30 (0.21)		0.13 (0.09)		
Spotfin shiner	13.06 (6.27)					18.90 (13.84)		8.50 (2.90)		
Common carp	0.04 (0.03)							0.07 (0.05)		
Speckled chub	0.06 (0.05)					0.10 (0.10)		0.03 (0.03)		
Golden shiner	0.24 (0.21)							0.43 (0.37)		
Emerald shiner	27.88 (15.79)					16.70 (8.20)		36.60 (27.53)		
River shiner	5.66 (5.20)					12.10 (11.88)		0.63 (0.32)		
Spottail shiner	0.10 (0.06)					0.10 (0.10)		0.10 (0.07)		
Sand shiner	3.52 (2.99)					6.80 (6.80)		0.97 (0.53)		
Weed shiner	0.32 (0.26)							0.57 (0.47)		
Mimic shiner	0.94 (0.67)					0.10 (0.10)		1.60 (1.19)		
Pugnose minnow	0.36 (0.19)					0.10 (0.10)		0.57 (0.34)		
Bluntnose minnow	0.04 (0.04)					0.10 (0.10)				
Bullhead minnow	3.90 (1.91)					6.20 (4.20)		2.10 (0.91)		
Quillback	0.21 (0.14)							0.37 (0.24)		
Silver redhorse	0.08 (0.05)					0.10 (0.10)		0.07 (0.05)		
Shorthead redhorse	0.04 (0.03)							0.07 (0.05)		
Yellow bullhead	0.02 (0.02)							0.03 (0.03)		
Channel catfish	0.04 (0.04)					0.10 (0.10)				
Northern pike	0.74 (0.25)					0.20 (0.13)		1.17 (0.44)		
Trout-perch	0.16 (0.10)					0.20 (0.20)		0.13 (0.08)		
Brook silverside	0.07 (0.04)							0.13 (0.08)		
White bass	0.22 (0.11)					0.20 (0.13)		0.23 (0.17)		
Rock bass	0.31 (0.09)					0.10 (0.10)		0.47 (0.14)		
Pumpkinseed	0.06 (0.05)					0.10 (0.10)		0.03 (0.03)		
Bluegill	1.66 (1.32)					0.20 (0.13)		2.80 (2.36)		
Green sunfish x bluegill	0.02 (0.02)							0.03 (0.03)		
Smallmouth bass	0.02 (0.02)							0.03 (0.03)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 1.3.8. Mean catch-per-unit-effort and (standard error) for fishes collected by seining in Pool 4 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 1.1). See text for definitions of catch-per-unit-effort and standard error.

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Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
White crappie	0.02 (0.02)							0.03 (0.03)		
Black crappie	0.35 (0.15)					0.20 (0.13)		0.47 (0.25)		
Western sand darter	0.86 (0.58)					0.50 (0.34)		1.13 (1.00)		
Mud darter	0.11 (0.04)							0.20 (0.07)		
Johnny darter	1.90 (0.85)					0.40 (0.27)		3.07 (1.51)		
Banded darter	0.02 (0.02)							0.03 (0.03)		
Yellow perch	0.06 (0.03)							0.10 (0.06)		
Logperch	0.06 (0.05)					0.10 (0.10)		0.03 (0.03)		
River darter	0.04 (0.04)							0.07 (0.07)		
Sauger	0.02 (0.02)							0.03 (0.03)		
Walleye	0.02 (0.02)							0.03 (0.03)		
Freshwater drum	0.06 (0.05)					0.10 (0.10)		0.03 (0.03)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 1.3.9. Mean catch-per-unit-effort and (standard error) for fishes collected by gill netting in Pool 4 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 1.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shovelnose sturgeon	0.03 (0.03)							0.12 (0.12)		
Longnose gar	0.08 (0.05)	0.09 (0.09)				0.15 (0.15)				
Bowfin	0.18 (0.08)	0.25 (0.13)						0.22 (0.15)		
Goldeye	0.04 (0.04)	0.08 (0.08)								
Mooneye	0.15 (0.09)	0.31 (0.18)								
Gizzard shad	0.47 (0.22)	0.94 (0.45)								
Common carp	3.25 (0.86)	4.32 (1.24)				2.41 (2.28)		2.03 (1.12)		
River carpsucker	0.04 (0.04)	0.08 (0.08)								
Quillback	0.12 (0.09)	0.24 (0.17)								
White sucker	0.05 (0.05)	0.09 (0.09)								
Blue sucker	0.03 (0.03)							0.11 (0.11)		
Smallmouth buffalo	1.52 (1.12)	3.01 (2.25)						0.10 (0.10)		
Bigmouth buffalo	0.04 (0.04)	0.08 (0.08)								
Spotted sucker	0.06 (0.05)	0.08 (0.08)						0.10 (0.10)		
Silver redhorse	0.70 (0.28)	1.26 (0.56)				0.32 (0.21)				
River redhorse	0.03 (0.03)					0.15 (0.15)				
Golden redhorse	0.04 (0.04)	0.08 (0.08)								
Shorthead redhorse	0.11 (0.06)	0.16 (0.11)				0.12 (0.12)				
Channel catfish	1.15 (0.50)	2.06 (1.00)				0.33 (0.21)		0.20 (0.20)		
Flathead catfish	0.08 (0.05)	0.09 (0.09)						0.12 (0.12)		
Northern pike	0.37 (0.15)	0.56 (0.29)				0.27 (0.18)		0.10 (0.10)		
White bass	0.79 (0.26)	1.11 (0.32)				0.18 (0.18)		0.70 (0.70)		
Smallmouth bass	0.03 (0.03)					0.14 (0.14)				
Walleye	0.28 (0.12)	0.39 (0.22)						0.29 (0.21)		
Freshwater drum	1.16 (0.36)	1.95 (0.70)				0.62 (0.32)		0.21 (0.14)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 1.4.1. Mean catch-per-unit-effort and (standard error) for fishes collected by night electrofishing in Pool 4 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Chestnut lamprey									0.08 (0.08)
Longnose gar									0.08 (0.08)
Shortnose gar									0.17 (0.11)
Mooneye									0.34 (0.26)
Gizzard shad									4.09 (1.06)
Spotfin shiner									0.81 (0.56)
Common carp									16.71 (3.65)
Silver chub									0.08 (0.08)
Emerald shiner									11.39 (9.35)
River shiner									0.42 (0.34)
Mimic shiner									0.42 (0.23)
Bullhead minnow									0.56 (0.25)
River carpsucker									0.33 (0.33)
White sucker									0.08 (0.08)
Smallmouth buffalo									0.17 (0.11)
Bigmouth buffalo									0.25 (0.25)
Silver redhorse									1.17 (0.83)
Golden redhorse									2.00 (1.32)
Shorthead redhorse									1.25 (0.86)
Channel catfish									0.50 (0.29)
Flathead catfish									0.42 (0.29)
Northern pike									0.67 (0.36)
Burbot									0.33 (0.19)
Brook silverside									0.42 (0.23)
White bass									5.50 (1.53)
Rock bass									1.17 (0.51)
Green sunfish									0.92 (0.57)
Bluegill									6.92 (4.59)
Smallmouth bass									4.31 (0.86)
Largemouth bass									1.83 (1.11)

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 1.4.1. Mean catch-per-unit-effort and (standard error) for fishes collected by night electrofishing in Pool 4 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 2

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
White crappie									0.83 (0.37)
Black crappie									1.83 (1.16)
Logperch									0.58 (0.43)
Sauger									11.58 (4.79)
Walleye									4.17 (1.35)
Freshwater drum									15.22 (5.86)

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 1.4.2. Mean catch-per-unit-effort and (standard error) for fishes collected by fyke netting in Pool 4 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
American eel									0.26 (0.26)
Common carp									1.86 (1.86)
Golden redhorse									0.26 (0.26)
Shorthead redhorse									0.52 (0.30)
Channel catfish									0.27 (0.27)
White bass									7.24 (4.90)
Smallmouth bass									0.53 (0.30)
Sauger									0.52 (0.30)
Walleye									0.26 (0.26)
Freshwater drum									10.74 (4.98)

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



Table 1.4.3. Mean catch-per-unit-effort and (standard error) for fishes collected by mini fyke netting in Pool 4 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Skipjack herring									0.27 (0.27)
Gizzard shad									3.98 (2.40)
Spotfin shiner									1.03 (0.74)
Common carp									0.27 (0.27)
Silver chub									0.51 (0.51)
Golden shiner									0.27 (0.27)
Emerald shiner									3.80 (3.46)
Sand shiner									0.26 (0.26)
Mimic shiner									0.25 (0.25)
Bullhead minnow									0.27 (0.27)
White bass									0.77 (0.49)
Smallmouth bass									0.25 (0.25)
Logperch									0.25 (0.25)
River darter									0.27 (0.27)

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 1.4.4. Mean catch-per-unit-effort and (standard error) for fishes collected by small hoop netting in Pool 4 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Common carp									1.13 (0.49)
Golden redhorse									0.12 (0.12)
Shorthead redhorse									0.48 (0.34)
Freshwater drum									0.12 (0.12)

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 1.4.5. Mean catch-per-unit-effort and (standard error) for fishes collected by large hoop netting in Pool 4 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Common carp									0.37 (0.12)
Silver redhorse									0.12 (0.12)
Channel catfish									0.12 (0.12)
Flathead catfish									0.65 (0.65)
Freshwater drum									0.36 (0.23)

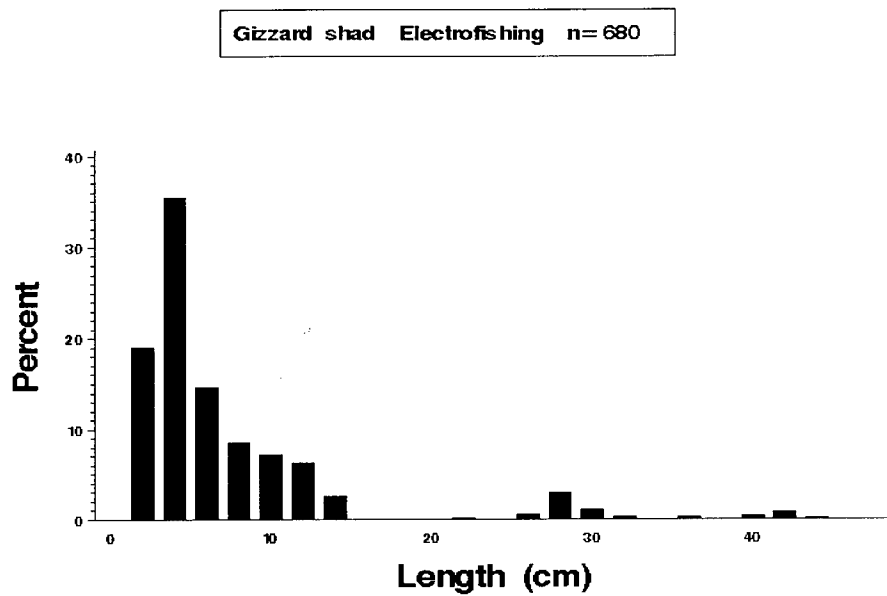
Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 1.4.6. Mean catch-per-unit-effort and (standard error) for fishes collected by bottom trawling in Pool 4 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

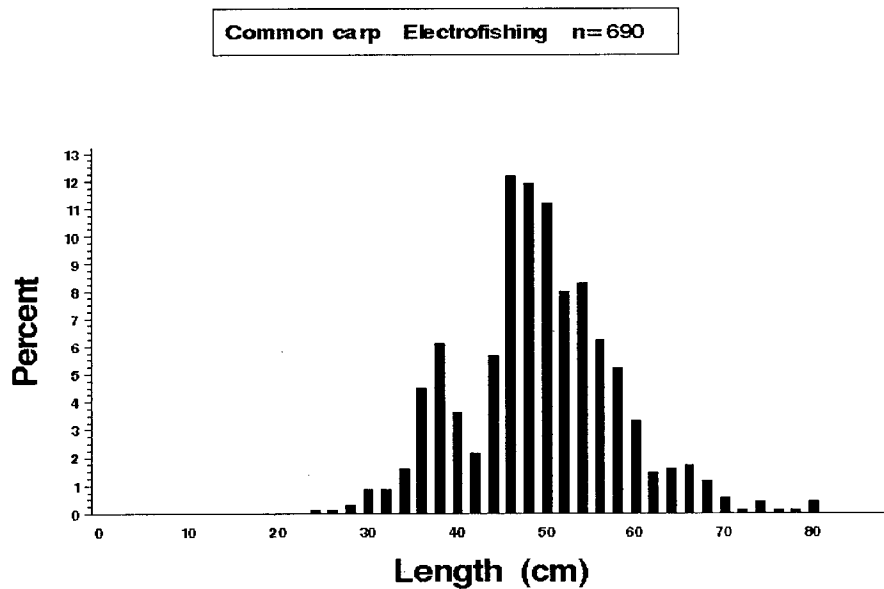
Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Channel catfish									0.13 (0.13)

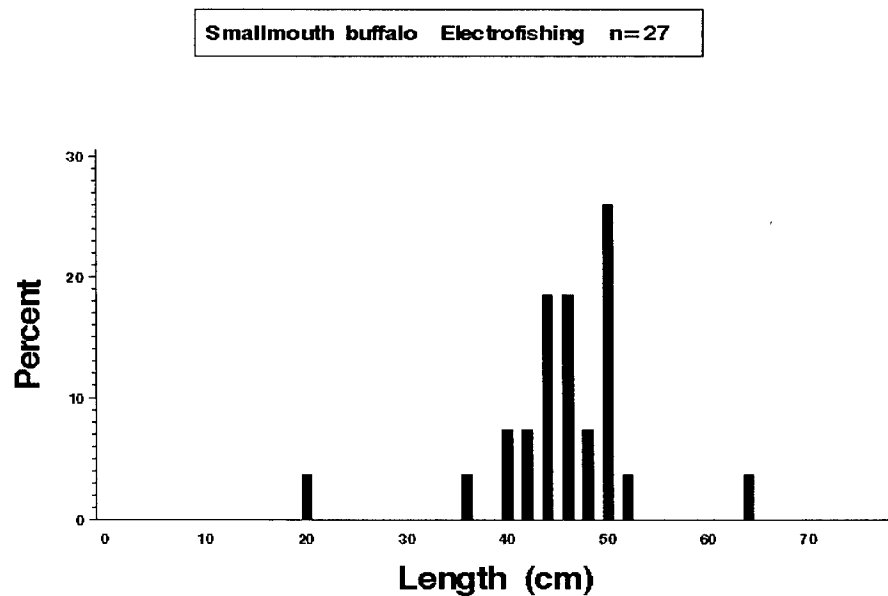
Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



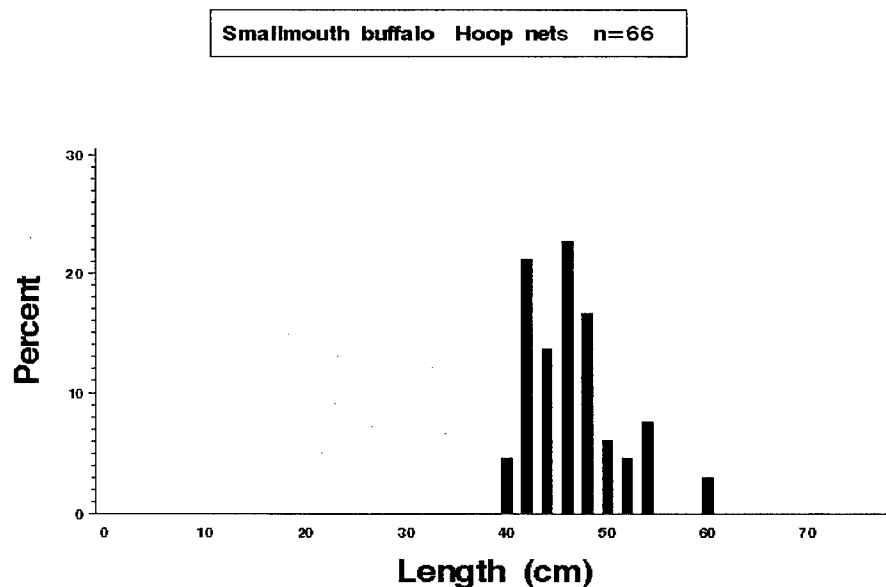
**Figure 1.2.** Length distributions (*length*) as a percentage of catch (*percent*) for gizzard shad (*Dorosoma cepedianum*) collected by electrofishing in Upper Mississippi River Pool 4 during 1993.



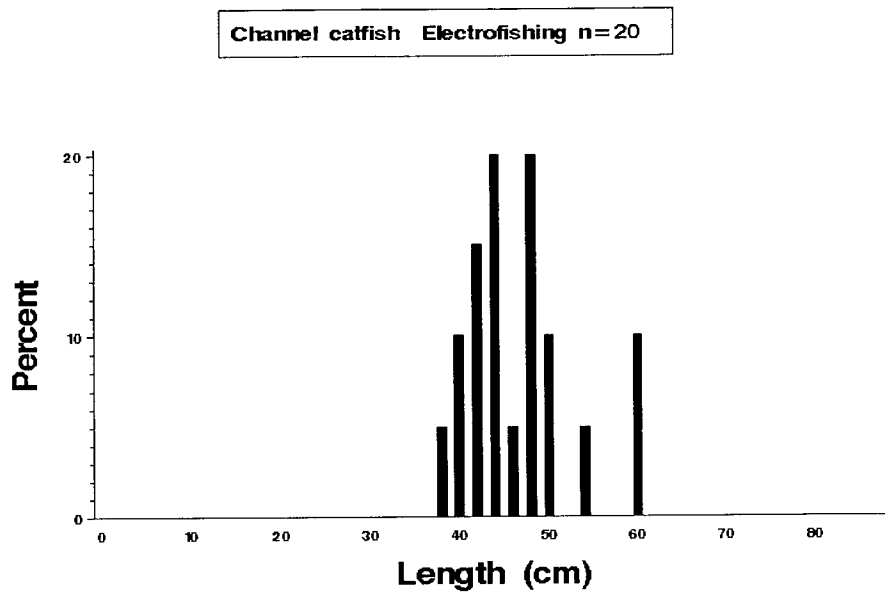
**Figure 1.3.** Length distributions (*length*) as a percentage of catch (*percent*) for common carp (*Cyprinus carpio*) collected by electrofishing in Upper Mississippi River Pool 4 during 1993.



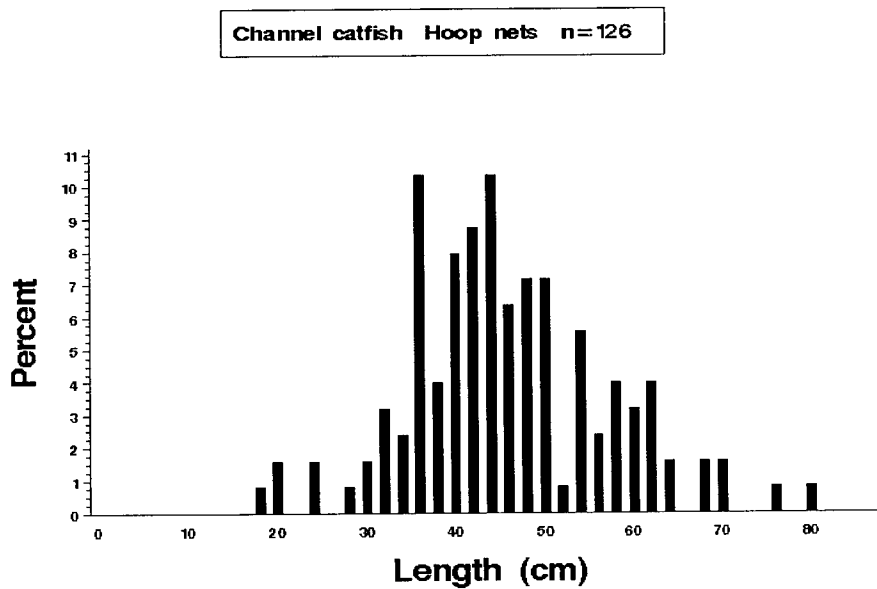
**Figure 1.4.** Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by electrofishing in Upper Mississippi River Pool 4 during 1993.



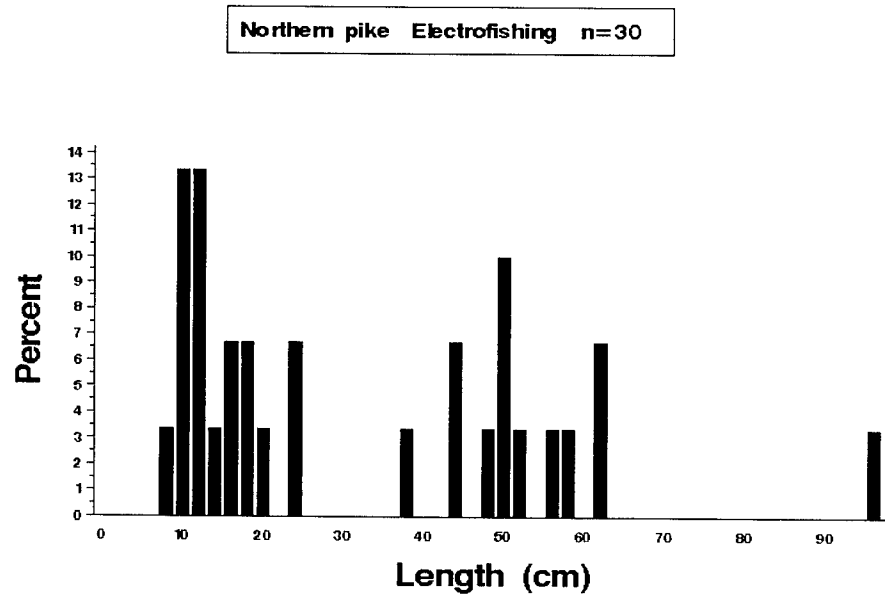
**Figure 1.5.** Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by large and small hoop netting in Upper Mississippi River Pool 4 during 1993.



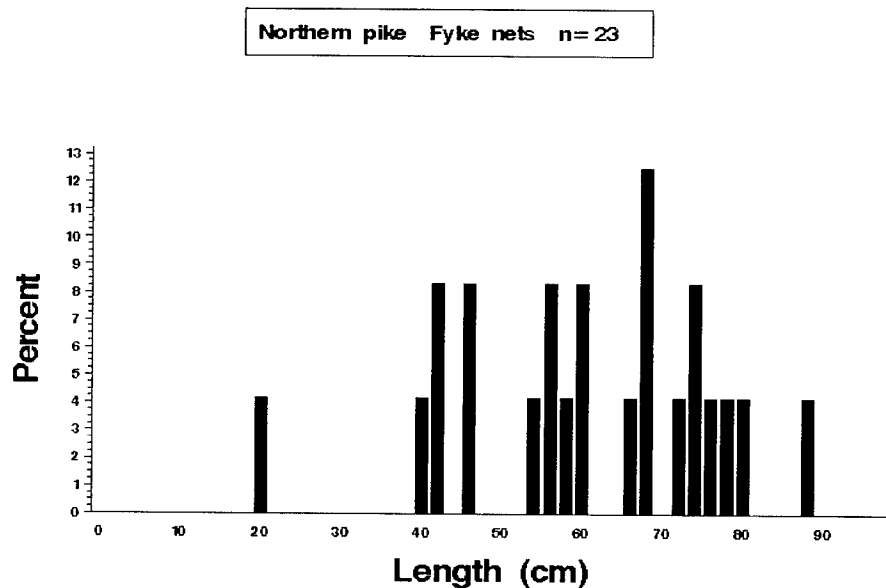
**Figure 1.6.** Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by electrofishing in Upper Mississippi River Pool 4 during 1993.



**Figure 1.7.** Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by large and small hoop netting in Upper Mississippi River Pool 4 during 1993.

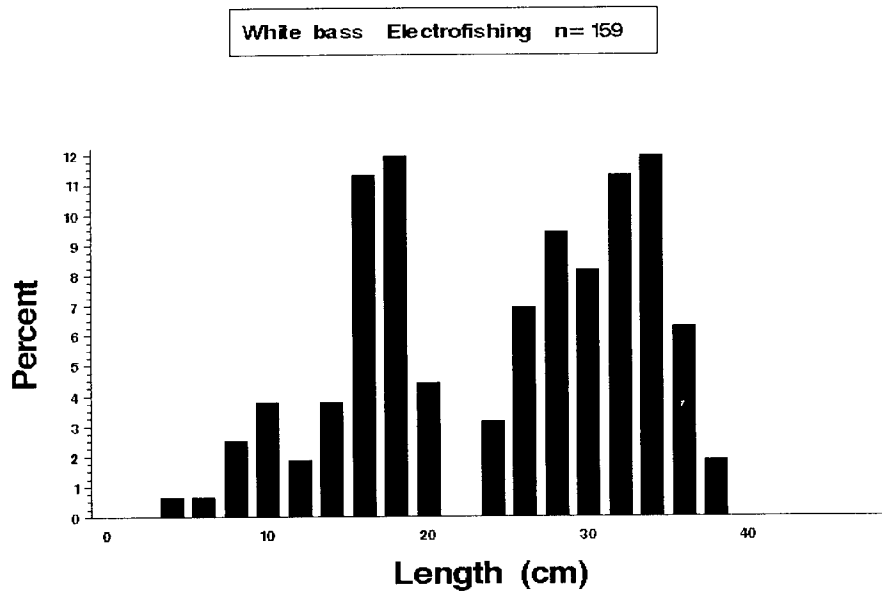


**Figure 1.8.** Length distributions (*length*) as a percentage of catch (*percent*) for northern pike (*Esox lucius*) collected by electrofishing in Upper Mississippi River Pool 4 during 1993.

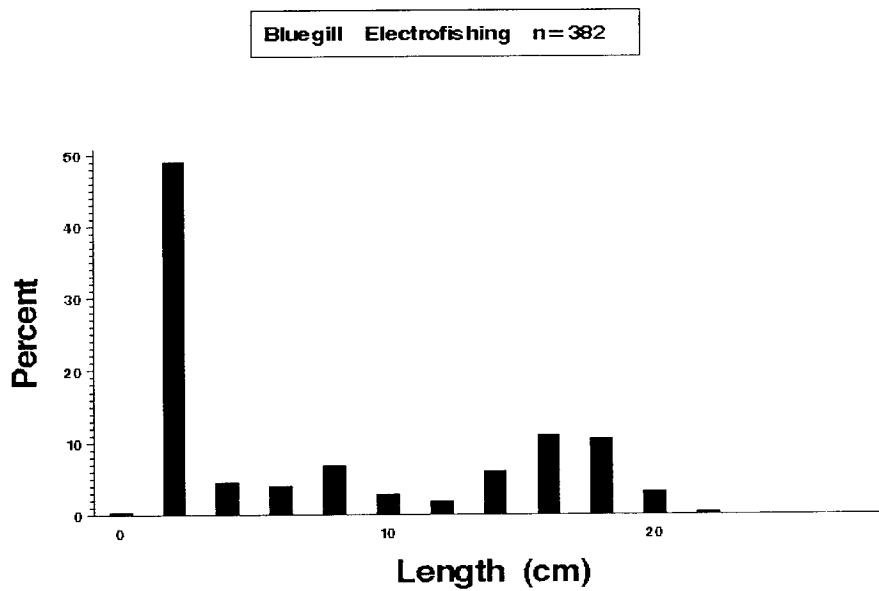


**Figure 1.9.** Length distributions (*length*) as a percentage of catch (*percent*) for northern pike (*Esox lucius*) collected by fyke netting in Upper Mississippi River Pool 4 during 1993.

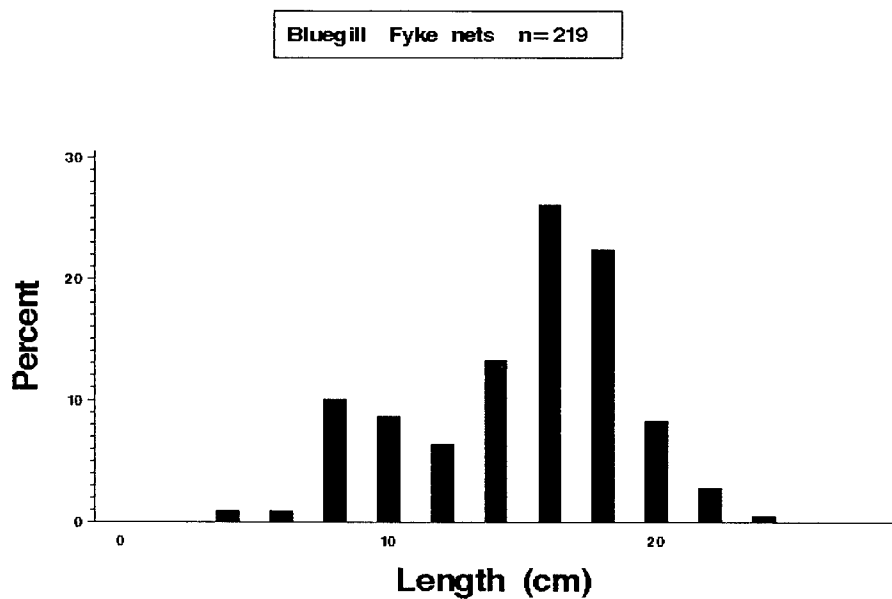




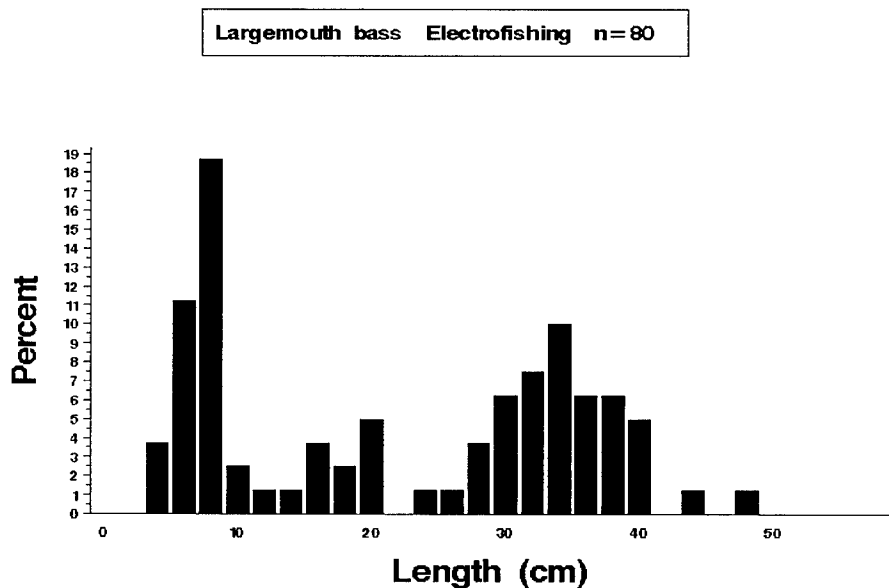
**Figure 1.10.** Length distributions (*length*) as a percentage of catch (*percent*) for white bass (*Morone chrysops*) collected by electrofishing in Upper Mississippi River Pool 4 during 1993.



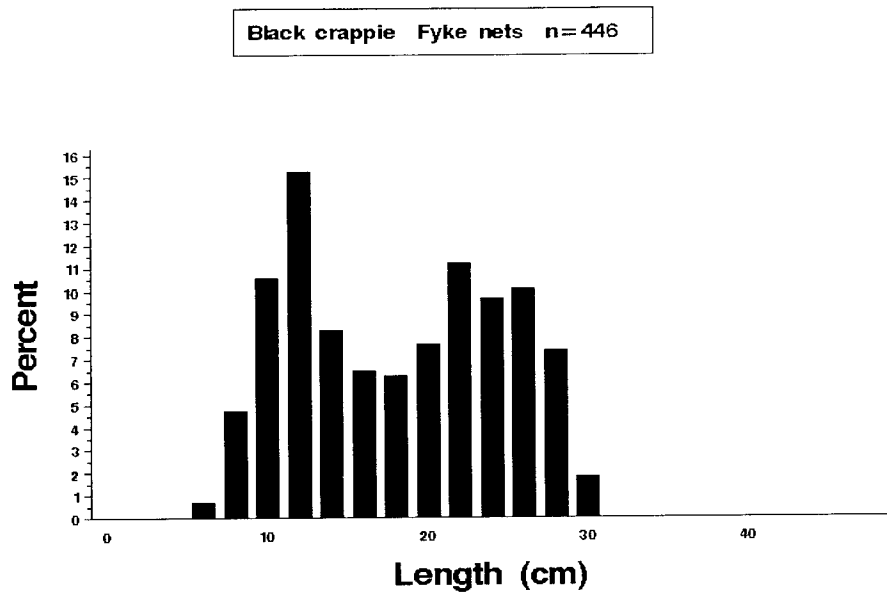
**Figure 1.11.** Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by electrofishing in Upper Mississippi River Pool 4 during 1993.



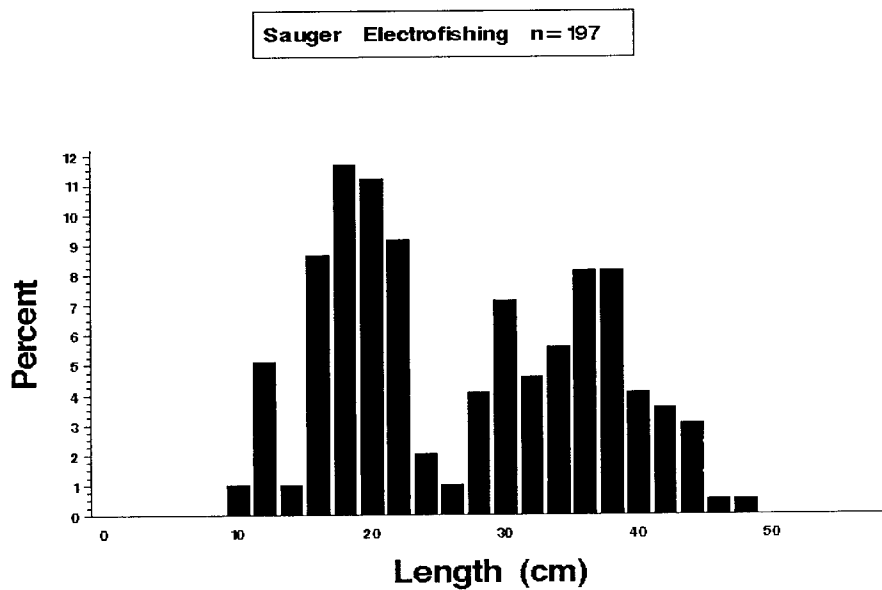
**Figure 1.12.** Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by fyke netting in Upper Mississippi River Pool 4 during 1993.



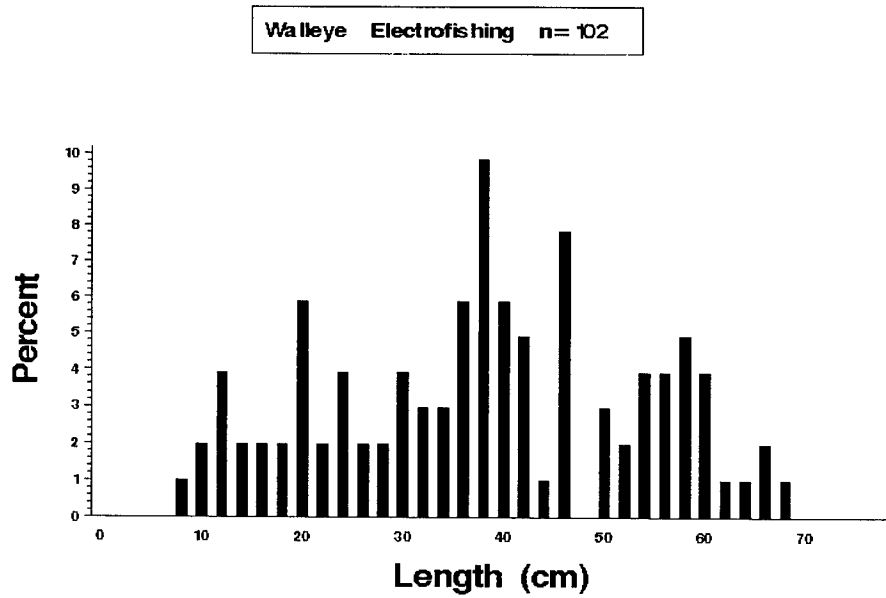
**Figure 1.13.** Length distributions (*length*) as a percentage of catch (*percent*) for largemouth bass (*Micropterus salmoides*) collected by electrofishing in Upper Mississippi River Pool 4 during 1993.



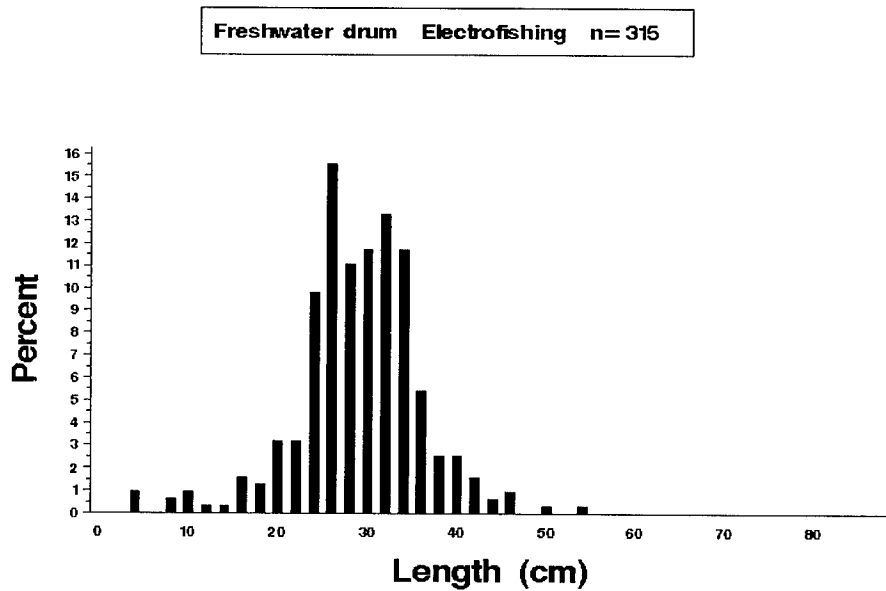
**Figure 1.14.** Length distributions (*length*) as a percentage of catch (*percent*) for black crappie (*Pomoxis nigromaculatus*) collected by electrofishing in Upper Mississippi River Pool 4 during 1993.



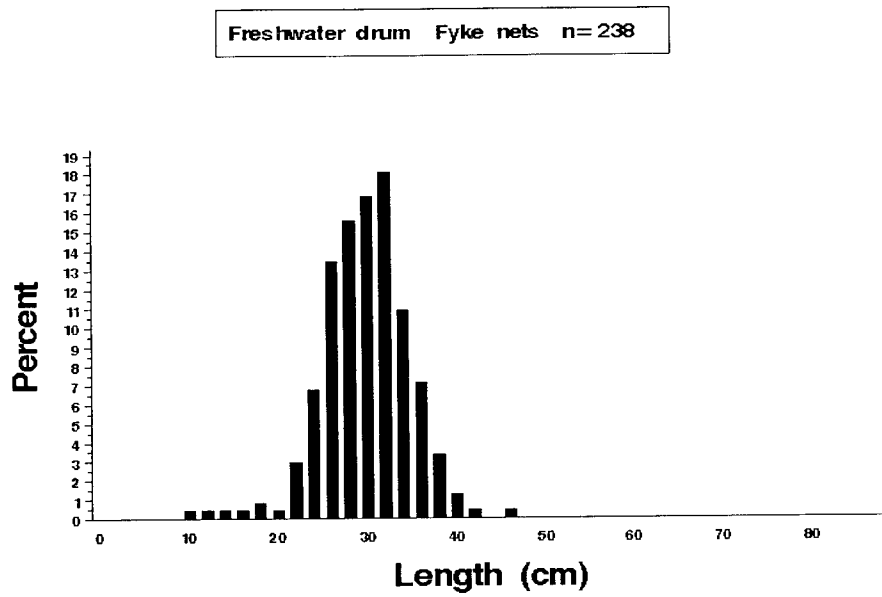
**Figure 1.15.** Length distributions (*length*) as a percentage of catch (*percent*) for sauger (*Stizostedion canadense*) collected by electrofishing in Upper Mississippi River Pool 4 during 1993.



**Figure 1.16.** Length distributions (*length*) as a percentage of catch (*percent*) for walleye (*Stizostedion vitreum*) collected by electrofishing in Upper Mississippi River Pool 4 during 1993.



**Figure 1.17.** Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by electrofishing in Upper Mississippi River Pool 4 during 1993.



**Figure 1.18.** Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by fyke netting in Upper Mississippi River Pool 4 during 1993.

## **Chapter 2. Pool 8, Upper Mississippi River**

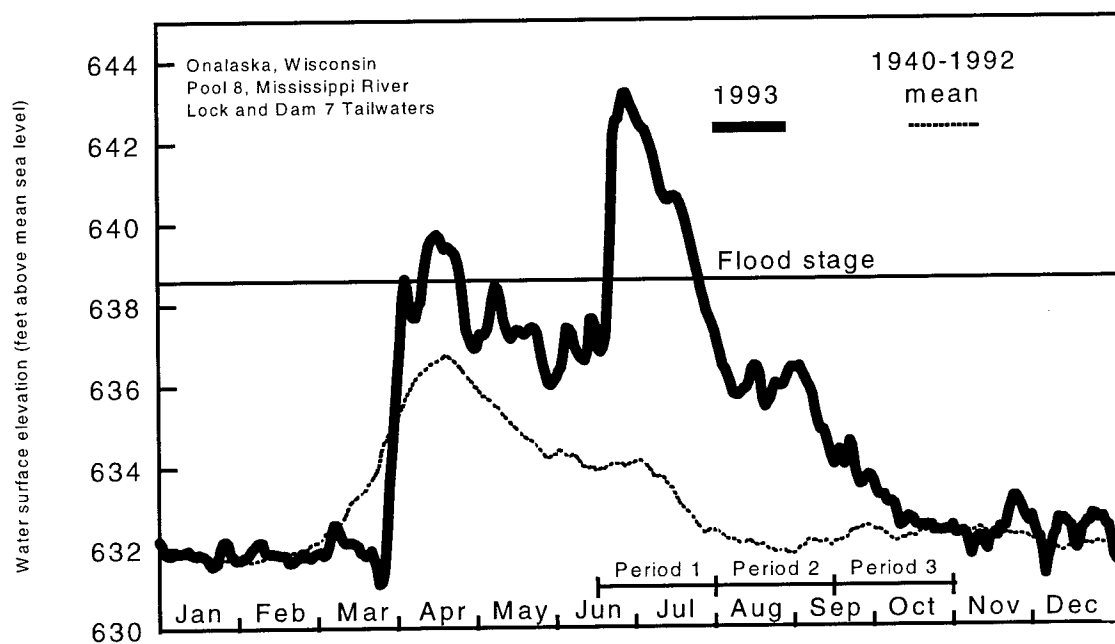
by

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## Hydrograph

The 1993 hydrograph for Pool 8 (Figure 2.1) indicated high water levels for the entire ice-free season. The river reached flood stage for 2 weeks in April and did not return to normal levels until mid-October. In late June, water levels again rose sharply, crested about 4 feet above flood stage, and remained above flood stage for most of July. Though river stages declined steadily from late July through early October, higher than normal water levels persisted until the middle of the third sampling period. Water levels significantly affected sampling in 1993. Many primary sites could not be sampled, and alternate sites were used for 22.5% of all collections, primarily during the flood.



**Figure 2.1.** Daily water surface elevation from Lock and Dam 7 for Pool 8, Upper Mississippi River, during 1993 and mean elevation since 1940. The U.S. Army Corps of Engineers discharge data were obtained from the Environmental Management Technical Center (Wlosinski et al. 1995).

## Summary of Sampling Effort

We made 580 fish collections in Pool 8 during 1993 (Table 2.1). Gear allocations across strata remained fairly consistent for all three sampling periods. The main exceptions were that BWCS fixed-site collections were eliminated in period 1 because of high water, and seining (MCBU) and fyke netting (BWCS) effort was increased for periods 2 and 3. Of the 580 collections, 502 were from randomly selected sites in the BWCO, BWCS, IMPO, IMPS, SCB, MCBU, and MCBW strata. Fifty-four collections were made at fixed TWZ sites, and 24 were from two fixed BWCS sites. The BWCS, SCB, and MCBU strata received the most sampling effort.

## Total Catch by Gear

We collected 28,420 fish representing 78 species and four hybrid crosses in 1993 (Table 2.2). This total does not include 112 fish <30 mm long identified only to family or genus. The five most abundant species in our samples were spotfin shiner (6,463), bluegill (4,245), emerald shiner (3,040), black crappie (1,940), and common carp (1,065). Total species (excluding hybrids) collected by gear type were day electrofishing (58), night electrofishing (63), fyke netting (35), tandem fyke netting (30), mini fyke netting (50), tandem mini fyke netting (23), seining (55), small hoop netting (17), large hoop netting (23), gill netting (12), and trawling (6). Fish distribution records for the Upper Mississippi River (Pitlo et al. 1995) document 99 fish species from Pool 8. Our species total before the 1993 season was 74; 10 new species, American brook lamprey, skipjack herring, brassy minnow, channel shiner, black buffalo, hog sucker, rainbow smelt, brown trout, burbot, and Iowa darter were added in 1993, bringing the cumulative total to 84. In 1993, we collected 1 skipjack herring, 2 crystal darters, and 5 pallid shiners, all of which are on Wisconsin's endangered species list. We also collected 1 black buffalo and 69 river redhorse in 1993, both listed as threatened in Wisconsin.

## Random Sampling, Mean *C/f* by Gear and Stratum

### *Day Electrofishing*

For day electrofishing (Table 2.3.1), spotfin shiner had the highest reachwide mean *C/f* (20.13), followed by common carp (9.05) and emerald shiner (6.01). Following are the fish species with the highest *C/f* within each stratum type: BWCS (bluegill, 12.68), IMPS (spottail shiner, 12.31), MCBU (emerald shiner, 11.85), MCBW (emerald shiner, 3.94), and SCB (spotfin shiner, 35.28).

### *Night Electrofishing*

For night electrofishing (Table 2.3.2), emerald shiner (9.58), shorthead redhorse (7.88), and sauger (6.29) had the highest reachwide mean *C/f*s. Following are the fish species with the highest *C/f* within each stratum type: BWCS (emerald shiner, 12.29), MCBU (emerald shiner, 14.05), MCBW (shorthead redhorse, 8.61), and SCB (spotfin shiner, 6.76).

### *Fyke Net*

Reachwide mean *C/f*s for fyke netting (Table 2.3.3) were highest for black crappie (29.25), bluegill (15.31), and shortnose gar (4.69). Black crappie also had the highest mean *C/f* in the BWCS (31.23) and IMPS (15.63) strata.

### *Tandem Fyke Net*

Reachwide mean *C/f*s for tandem fyke netting (Table 2.3.4) were highest for black crappie (3.64), followed by freshwater drum (1.87) and shorthead redhorse (1.02). These species had the highest *C/f* within each stratum type: BWCO (black crappie, 28.33) and IMPO (freshwater drum, 1.50).



### *Mini Fyke Net*

Bluegill (28.57) had the highest reachwide mean *C/f* for mini fyke nets (Table 2.3.5), followed by pugnose minnow (8.92) and spotfin shiner (8.27). Bluegill also dominated *C/f* for mini fyke nets in the BWCS (47.49) and SCB (28.83) strata. Spotfin shiner had the highest *C/f* in the IMPS (11.75), MCBU (6.42), and MCBW (1.17) strata.

### *Tandem Mini Fyke Net*

Spotfin shiner (0.25) had the highest reachwide mean *C/f* for tandem mini fyke netting (Table 2.3.6), followed by channel shiner (0.20), bluegill (0.18), and freshwater drum (0.18). Spotfin shiner had the highest mean *C/f* in the BWCO stratum (1.42), and channel shiner *C/f* (0.23) was the highest in the IMPO stratum.

### *Small Hoop Net*

For small hoop nets (Table 2.3.7), channel catfish had the highest reachwide mean *C/f* (1.23) and the highest *C/f* for each stratum type: BWCO (0.58), IMPO (1.60), MCBU (0.93), MCBW (1.24), and SCB (0.45). The next highest reachwide mean *C/f*s were held by shorthead redhorse (0.39) and common carp (0.21).

### *Large Hoop Net*

For large hoop nets (Table 2.3.8), smallmouth buffalo had the highest reachwide mean *C/f* (0.91), followed by channel catfish (0.61) and common carp (0.52). Channel catfish had the highest stratumwide *C/f* for large hoop nets in the BWCO (0.75) and SCB (0.57) strata. In the IMPO (1.20) and MCBU (0.88) strata, smallmouth buffalo had the highest *C/f*. Shorthead redhorse (0.29) had the highest mean *C/f* in the MCBW stratum.

### *Seine*

Spotfin shiner (45.13) had the highest reachwide mean *C/f* for seining (Table 2.3.9), followed by emerald shiner (13.92) and bluegill (8.15). Following are the fish species with the highest *C/f* within each stratum type: BWCS (bluegill, 22.56), MCBU (spotfin shiner, 27.00), and SCB (spotfin shiner, 91.63).

### *Gill Net*

Common carp (0.38) had the highest reachwide mean *C/f* for gill nets (Table 2.3.10). Freshwater drum (0.33) and silver redhorse (0.15) had the next highest reachwide catch rates. Common carp (0.51) had the highest mean *C/f* from the IMPO stratum, and shovelnose sturgeon (0.50) was most abundant in SCB gill nets. No fish were collected from the MCBU stratum in gill nets.

## **Fixed Sampling, Mean *C/f* by Gear and Stratum**

### *Day Electrofishing*

For day electrofishing in 1993 at the two BWCS fixed sites in Pool 8, spotfin shiner (37.93) had the highest mean *C/f* (Table 2.4.1). Emerald shiner (15.75) and bluegill (10.45) were the next most abundant.

### *Night Electrofishing*

Night electrofishing, conducted at four TWZ fixed sites in 1993 (Table 2.4.2), yielded sauger (*C/f* = 29.67) in greatest abundance. The next highest mean *C/f*s for tailwater night electrofishing were for freshwater drum (16.07) and smallmouth bass (12.31).

### *Fyke Net*

Bluegill (28.20) had the highest *C/f* for fyke nets at two BWCS fixed sites (Table 2.4.3). The following fish species had the next highest catch rates: black crappie (21.89) and yellow perch (3.91).

### *Mini Fyke Net*

For mini fyke netting at the TWZ fixed sites (Table 2.4.4), spotfin shiner (18.22) had the highest mean *C/f*. Bluegill (8.08) and emerald shiner (3.29) were the next most abundant.

### *Small Hoop Net*

Channel catfish had the highest mean *C/f* (1.12) for small hoop nets (Table 2.4.5) in the TWZ stratum. The next most abundant taxa were flathead catfish (0.41), rock bass (0.16), and freshwater drum (0.16).

### *Large Hoop Net*

Freshwater drum had the highest mean *C/f* (1.39) in large hoop nets at the TWZ fixed sites (Table 2.4.6). Silver redhorse (1.15) and black crappie (0.74) were the next most abundant fishes.

### *Seine*

For fixed-site BWCS seining (Table 2.4.7), spotfin shiner (mean *C/f* = 44.38) was most abundant, followed by emerald shiner (24.50) and bluegill (6.50). For TWZ fixed sites, spotfin shiner (19.25) had the highest *C/f*, followed by emerald shiner (12.00) and bluegill (7.17).

## *Trawl*

Channel catfish (2.67) had the highest mean *C/f* in TWZ trawls (Table 2.4.8). Following channel catfish were shovelnose sturgeon (1.08) and shorthead redhorse (0.42).

## **Length Distributions of Selected Species**

Length distributions are presented for selected species in Figures 2.2 to 2.19. The length distributions presented may be limited by the size selectiveness of the particular gear. Care should be used when trying to interpret length distributions from samples <100 (Anderson and Neumann 1996); they are presented in this report because of local interest in the species by river managers.

### *Gizzard Shad*

Most gizzard shad collected by electrofishing in Pool 8 during 1993 were less than 7 cm long (Figure 2.2). Sample size was 79 fish. Less than 10% of the gizzard shad were longer than 10 cm. The overall size range was 17–43 cm.

### *Common Carp*

The electrofishing length distribution from 871 common carp (Figure 2.3) showed a large group of fish from 42 to 60 cm long with few fish outside this range. There were no common carp less than 25 cm long. Given the abundance of adults, this paucity of juveniles is puzzling.

### *Smallmouth Buffalo*

Smallmouth buffalo collected by electrofishing showed a different picture from those collected by hoop nets. The 44 smallmouth buffalo collected by electrofishing (Figure 2.4) ranged mostly from 10 to 20 cm long. Few large adults were collected by electrofishing. We collected 72 smallmouth buffalo in tandem hoop net sets (Figure 2.5) in 1993, most of which were longer than 35 cm, with a substantial number more than 50 cm long.

### *Channel Catfish*

The 1993 length distributions for channel catfish using electrofishing (Figure 2.6) and tandem hoop nets (Figure 2.7) were similar. The most abundant size class occurred at 20 cm long. Good numbers of channel catfish were also evenly distributed between 30 and 50 cm long. Sample sizes for electrofishing and tandem hoop netting were 79 and 195 fish, respectively.

### *Northern Pike*

The 1993 northern pike length distribution, represented as 57 fish collected by electrofishing (Figure 2.8), indicated strong numbers of young-of-the-year ranging from 8 to 24 cm long. The length distribution for

20 northern pike collected by fyke netting (Figure 2.9) shows a range of lengths from 20 to 90 cm long, with the largest percentage between 600 and 70 cm long.

### *White Bass*

The most abundant lengths of 184 white bass we collected with electrofishing in 1993 (Figure 2.10) were 16–18 cm and accounted for more than 60% of the total. The complete size range for white bass extended from 2 to 40 cm long.

### *Bluegill*

We collected 651 bluegills during electrofishing in 1993 (Figure 2.11). The electrofishing distribution was skewed toward small fish, represented primarily by bluegills less than 6 cm long. The 858 bluegills collected in fyke nets (Figure 2.12) averaged much larger than those from electrofishing. Still, the largest group of fish was around 10 cm long. The percentage of the bluegill catch from fyke netting that was greater than 15 cm long was about 30%.

### *Largemouth Bass*

The electrofishing length distribution from 305 largemouth bass (Figure 2.13) shows three distinct groups in abundance (around 10, 20, and 36 cm long). Those 10 cm long or less made up about 20% of the catch, whereas those longer than 40 cm made up only about 1% of the catch.

### *White Crappie*

The sample size for white crappie, collected in fyke nets, was 68 fish. The length distribution for white crappie (Figure 2.14) showed an even distribution of medium and large fish. This fish is not abundant in Pool 8, but populations seem to be stable.

### *Black Crappie*

We collected 1,743 black crappie in fyke nets in 1993 (Figure 2.15). Most of the fish collected were from 10 to 20 cm long. We collected few black crappies more than 30 cm long.

### *Sauger*

The sample size for sauger collected by electrofishing in 1993 was 835 (Figure 2.16). The distribution was nearly bell-shaped and ranged from 16 to 22 cm long.

### *Walleye*

We collected 16 walleye in 1993 by electrofishing. Similar to the sauger distribution, the length distribution for walleye was rather bell-shaped, but with a longer right-hand tail (Figure 2.17). The majority of the catch was from 20 to 30 cm long, with another group apparent between 50 and 60 cm long.

### *Freshwater Drum*

The length distribution for freshwater drum collected by electrofishing represents 423 fish (Figure 2.18). Most freshwater drum in the electrofishing catch during 1993 were less than 20 cm long. A similar picture was indicated by 123 drum collected in fyke nets (Figure 2.19). About 40% of the fyke net catch was evenly distributed from 20 to 45 cm long and about 25% were more than 30 cm long.

Table 2.1. Allocation of fish sampling effort among strata by the Long Term Resource Monitoring Program in Pool 8 of the Mississippi River during 1993. Table entries are numbers of successfully completed standardized monitoring collections.

Table page: 1

Sampling period = 1: June 15 - July 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	TRI	TWZ	TOTAL
Day electrofishing	8		6	4	4	4				26
Fyke net	8					4				12
Gill net			2	2			4			8
Large hoop net		4	4	4	4		4		2	22
Small hoop net		4	4	4	4		4		2	22
Mini fyke net	8		6	4	4	4			2	28
Night electrofishing	2		4	4	4				4	18
Seine	16		8	8					4	36
Trawling									4	4
Tandem fyke net		2					2			4
Tandem mini fyke net		2					2			4
SUBTOTAL	42	12	34	30	20	12	16	0	18	184

Sampling period = 2: August 1 - September 14

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	TRI	TWZ	TOTAL
Day electrofishing	12		6	4	4	4				30
Fyke net	16					4				20
Gill net			2				4			6
Large hoop net		4	4	4	4		4		2	22
Small hoop net		4	4	4	4		4		2	22
Mini fyke net	8		6	4	4	4			2	28
Night electrofishing	2		4	4	4				4	18
Seine	12		8	16					4	40
Trawling									4	4
Tandem fyke net		2					2			4
Tandem mini fyke net		2					2			4
SUBTOTAL	50	12	34	36	20	12	16	0	18	198

Sampling period = 3: September 15 - October 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	TRI	TWZ	TOTAL
Day electrofishing	12		6	4	4	4				30
Fyke net	16					4				20
Gill net			2				4			6
Large hoop net		4	4	4	4		4		2	22
Small hoop net		4	4	4	4		4		2	22
Mini fyke net	8		6	4	4	4			2	28
Night electrofishing	2		4	4	4				4	18
Seine	12		8	16					4	40
Trawling									4	4
Tandem fyke net		2					2			4
Tandem mini fyke net		2					2			4
SUBTOTAL	50	12	34	36	20	12	16	0	18	198
	142	36	102	102	60	36	48	0	54	580

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1993 in Pool 8 of the Mississippi River. See Table 2.1 for the list of sampling gears actually deployed in this study reach.

Species	Common name	Scientific name	D	N	F	X	M	Y	S	HS	HL	G	T	TOTAL
1	Chestnut lamprey	Ichthyomyzon castaneus	8	6	-	-	-	-	1	-	-	-	-	15
2	Silver lamprey	Ichthyomyzon unicuspis	5	-	-	-	-	-	-	-	-	-	-	5
3	American brook lamprey	Lampetra appendix	-	1	-	-	-	-	-	-	-	-	-	1
4	Shovelnose sturgeon	Scaphirhynchus platyrhynchus	-	-	-	-	-	-	-	-	-	3	13	16
5	Longnose gar	Lepisosteus osseus	34	37	115	14	5	-	4	-	2	1	-	212
6	Shortnose gar	Lepisosteus platostomus	2	8	182	9	11	-	-	-	1	-	-	213
7	Bowfin	Amia calva	16	8	47	15	1	-	1	-	-	-	-	88
8	Mooneye	Hiodon tergisus	8	34	3	2	-	-	-	-	-	2	3	52
9	Skipjack herring	Alosa chrysochloris	-	-	-	-	-	-	1	-	-	-	-	1
10	Gizzard shad	Dorosoma cepedianum	75	4	6	-	10	-	81	-	1	-	-	177
11	Spotfin shiner	Cyprinella spiloptera	1559	145	-	-	696	18	4045	-	-	-	-	6463
12	Common carp	Cyprinus carpio	620	251	113	16	1	1	1	18	37	7	-	1065
13	Brassy minnow	Hybognathus hankinsoni	1	-	-	-	-	-	-	-	-	-	-	2
14	Mississippi silvery minnow	Hybognathus nuchalis	156	16	-	-	6	-	272	-	-	-	-	450
15	Silver chub	Macrhybopsis storeriana	1	7	-	-	-	-	-	-	-	-	-	8
16	Golden shiner	Notemigonus crysoleucas	35	1	9	-	10	1	8	-	-	-	-	64
17	Pallid shiner	Notropis amnis	-	-	-	-	-	-	5	-	-	-	-	5
18	Emerald shiner	Notropis atherinoides	633	446	-	-	196	4	1761	-	-	-	-	3040
19	River shiner	Notropis bienni	223	52	-	-	28	-	489	-	-	-	-	792
20	Spottail shiner	Notropis hudsonius	182	7	-	-	5	-	31	-	-	-	-	225
21	Sand shiner	Notropis stramineus	-	5	-	-	-	1	3	-	-	-	-	9
22	Weed shiner	Notropis texanus	4	1	-	-	85	2	55	-	-	-	-	147
23	Mimic shiner	Notropis volucellus	8	8	-	-	2	-	41	-	-	-	-	59
24	Channel shiner	Notropis wickliffi	12	25	-	-	17	3	90	-	-	-	-	147
25	Pugnose minnow	Opsopoeodus emiliae	7	3	-	-	543	11	252	-	-	-	-	816
26	Bluntnose minnow	Pimephales notatus	1	-	-	-	-	-	1	-	-	-	-	2
27	Fathead minnow	Pimephales promelas	28	-	-	-	7	-	71	-	-	-	-	106
28	Bullhead minnow	Pimephales vigilax	340	41	-	-	109	2	398	-	-	-	-	890
29	River carpsucker	Carpilodes carpio	-	12	2	2	-	-	-	-	-	-	-	16
30	Quillback	Carpilodes cyprinus	24	67	3	2	4	-	133	-	1	-	-	234
31	Highfin carpsucker	Carpilodes velifer	-	2	-	-	-	-	-	-	-	-	-	2
32	Unidentified carpsucker	Carpilodes sp.	-	-	-	-	1	-	30	-	-	-	-	31
33	White sucker	Catostomus commersoni	2	2	2	-	-	-	-	-	-	-	-	6
34	Northern hog sucker	Hypentelium nigricans	-	1	-	-	-	-	-	-	-	-	-	1
35	Smallmouth buffalo	Ictiobus bubalus	8	36	10	6	1	-	1	2	70	-	-	134
36	Bigmouth buffalo	Ictiobus cyprinellus	3	4	-	-	-	-	-	-	-	1	-	8
37	Black buffalo	Ictiobus niger	-	1	-	-	-	-	-	-	-	-	-	1
38	Spotted sucker	Minytrema melanops	33	24	10	9	-	-	102	1	1	-	-	180
39	Silver redbreast	Moxostoma anisurum	96	184	72	23	-	-	6	5	29	3	-	418

Gears: D - Day electrofishing  
 N - Night electrofishing  
 F - Fyke netting  
 X - Tandem fyke netting  
 M - Mini fyke netting  
 Y - Tandem mini fyke netting

S - Seining  
 HS - Small hoop netting  
 HL - Large hoop netting  
 G - Gill netting  
 T - Trawling (4.8-m bottom trawl)

Table 2.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1993 in Pool 8 of the Mississippi River. See Table 2.1 for the list of sampling gears actually deployed in this study reach.

Table page: 2

Species	Common name	Scientific name	D	N	F	X	M	Y	S	HS	HL	G	T	TOTAL
40	River redborse	Moxostoma carinatum	21	47	-	-	-	-	-	-	1	-	-	69
41	Golden redborse	Moxostoma erythrum	81	100	4	2	-	-	2	1	1	-	-	191
42	Shorthead redborse	Moxostoma macrolepidotum	183	545	27	21	13	2	10	61	32	3	5	902
43	Unidentified redborse	Moxostoma sp.	18	-	-	-	-	-	-	-	-	-	-	19
44	Unidentified sucker	Catostomid sp.	10	-	-	-	3	-	-	-	-	-	-	13
45	Black bullhead	Ameiurus melas	-	-	1	-	-	-	-	-	-	-	-	1
46	Yellow bullhead	Ameiurus natalis	1	1	-	-	1	-	-	4	-	-	-	7
47	Brown bullhead	Ameiurus nebulosus	-	-	-	-	-	1	-	-	1	-	-	2
48	Channel catfish	Ictalurus punctatus	17	62	17	2	-	-	1	131	64	2	32	328
49	Tadpole madtom	Noturus gyrinus	-	1	-	-	20	1	53	-	-	-	-	75
50	Flathead catfish	Pylodictis olivaris	17	28	4	2	2	1	1	6	19	-	-	80
51	Northern pike	Esox lucius	34	23	14	6	23	-	11	-	3	3	-	117
52	Central mudminnow	Umbra limi	-	-	-	-	8	-	-	-	-	-	-	8
53	Rainbow smelt	Osmerus mordax	-	-	-	-	1	-	-	-	-	-	-	1
54	Brown trout	Salmo trutta	-	-	1	-	-	-	-	-	-	-	-	1
55	Trout-perch	Percopsis omiscomaycus	7	1	-	-	-	4	3	-	-	-	-	15
56	Burbot	Lota lota	4	4	-	-	2	-	-	-	-	-	-	10
57	Brook silverside	Labidesthes sicculus	16	10	-	-	4	-	107	-	-	-	-	137
58	White bass	Morone chrysops	24	160	47	11	43	1	4	-	5	1	-	296
59	Yellow bass	Morone mississippiensis	-	-	-	1	-	-	-	-	-	-	-	1
60	Rock bass	Ambloplites rupestris	104	64	23	1	20	-	10	7	1	-	-	230
61	Green sunfish	Lepomis cyanellus	177	13	1	1	18	-	6	-	-	-	-	216
62	Pumpkinseed	Lepomis gibbosus	11	1	24	4	8	-	-	-	-	-	-	48
63	Warmouth	Lepomis gulosus	-	2	1	-	4	-	3	-	-	-	-	10
64	Orangespotted sunfish	Lepomis humilis	14	10	6	5	9	-	1	-	-	-	-	45
65	Bluegill	Lepomis macrochirus	584	67	837	21	1846	6	867	2	15	-	-	4245
66	Green sunfish x warmouth	L. cyanellus x L. gulosus	-	-	1	-	1	-	-	-	-	-	-	2
67	Unidentified Lepomis	Lepomis sp.	15	5	-	-	3	-	26	-	-	-	-	9
68	Smallmouth bass	Micropterus dolomieu	108	313	2	1	-	1	9	1	1	1	-	437
69	Largemouth bass	Micropterus salmoides	278	27	6	1	8	-	23	-	-	-	-	343
70	White crappie	Pomoxis annularis	5	10	36	32	5	-	1	-	1	-	-	90
71	Black crappie	Pomoxis nigromaculatus	48	46	1387	356	36	1	34	7	25	-	-	1940
72	White x black crappie	P. annularis x P. nigromaculatus	-	-	-	1	-	-	-	-	-	-	-	1
73	Crystal darter	Ammocrypta asprella	-	-	-	-	-	-	2	-	-	-	-	2
74	Western sand darter	Ammocrypta clara	1	1	-	-	1	-	98	-	-	-	-	101
75	Mud darter	Etheostoma asprigene	8	4	-	-	28	2	24	-	-	-	-	66
76	Iowa darter	Etheostoma exile	-	-	-	-	1	-	-	-	-	-	-	1
77	Johnny darter	Etheostoma nigrum	60	6	-	-	74	1	168	-	-	-	-	309

Gears: D - Day electrofishing  
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X - Tandem fyke netting  
M - Mini fyke netting  
Y - Tandem mini fyke netting

S - Seining  
HS - Small hoop netting  
HL - Large hoop netting  
G - Gill netting  
T - Trawling (4.8-m bottom trawl)



Table 2.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1993 in Pool 8 of the Mississippi River. See Table 2.1 for the list of sampling gears actually deployed in this study reach.

Table page: 3

Species	Common name	Scientific name	D	N	F	X	M	Y	S	HS	HL	G	T	TOTAL
79	Yellow perch	Perca flavescens	39	68	61	8	3	-	11	1	-	-	-	191
80	Logperch	Percina caprodes	46	18	-	-	12	1	21	-	-	-	-	98
81	Slenderhead darter	Percina phoxocephala	-	1	-	-	1	1	15	-	-	-	-	18
82	River darter	Percina shumardi	4	1	-	-	4	1	4	-	-	-	-	14
83	Sauger	Stizostedion canadense	114	721	14	4	11	-	11	1	-	-	1	877
84	Walleye	Stizostedion vitreum	24	136	10	4	5	-	1	1	4	-	-	185
85	Sauger x walleye	S. canadense x S. vitreum	1	-	-	-	-	-	-	-	-	-	-	1
86	Freshwater drum	Aplodinotus grunniens	45	378	50	73	15	4	5	14	36	6	4	630
			=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
			6251	4313	3149	655	3973	70	9416	263	351	33	58	28532

Gears: D - Day electrofishing  
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G - Gill netting  
T - Trawling (4.8-m bottom trawl)

Table 2.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by day electrofishing in Pool 8 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 2.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Chestnut lamprey	0.09 (0.04)		0.03 (0.03)					0.19 (0.11)		
Silver lamprey	0.05 (0.03)		0.03 (0.03)		0.16 (0.16)			0.08 (0.08)		
Longnose gar	0.14 (0.07)					0.07 (0.07)	0.93 (0.93)	0.33 (0.18)		
Shortnose gar	0.03 (0.02)		0.04 (0.04)			0.08 (0.08)				
Bowfin	0.20 (0.06)		0.46 (0.17)		0.16 (0.16)			0.09 (0.06)		
Mooneye	0.16 (0.09)					0.16 (0.16)		0.32 (0.22)		
Gizzard shad	0.68 (0.35)		1.54 (0.99)		1.89 (1.37)			0.15 (0.12)		
Spotfin shiner	20.13 (5.09)		11.92 (6.90)		8.80 (7.29)	9.95 (3.46)	0.16 (0.12)	35.28 (11.74)		
Common carp	9.05 (1.91)		6.16 (1.11)		4.21 (1.38)	2.45 (0.87)	1.30 (0.94)	16.33 (4.94)		
Brassy minnow	0.02 (0.02)							0.06 (0.06)		
Mississippi silvery minnow	0.68 (0.49)		0.30 (0.18)		11.37 (9.89)	0.07 (0.07)				
Silver chub	0.02 (0.02)							0.06 (0.06)		
Golden shiner	0.49 (0.16)		0.97 (0.41)		0.15 (0.10)	0.17 (0.17)		0.30 (0.20)		
Emerald shiner	6.01 (1.14)		1.01 (0.55)		5.36 (3.50)	11.85 (3.91)	3.94 (3.45)	7.08 (1.75)		
River shiner	2.00 (0.77)		0.50 (0.42)		9.61 (8.55)	4.83 (2.66)		0.66 (0.44)		
Spottail shiner	0.97 (0.49)		0.64 (0.52)		12.31 (9.16)	0.09 (0.09)		0.33 (0.16)		
Weed shiner	0.06 (0.03)					0.16 (0.11)		0.06 (0.06)		
Mimic shiner	0.09 (0.05)		0.08 (0.08)		0.22 (0.22)			0.13 (0.09)		
Channel shiner	0.13 (0.07)				0.23 (0.16)	0.37 (0.28)		0.09 (0.09)		
Pugnose minnow	0.06 (0.03)		0.11 (0.06)					0.06 (0.06)		
Bluntnose minnow	0.02 (0.02)							0.06 (0.06)		
Fathead minnow	0.15 (0.09)				1.94 (1.70)	0.15 (0.15)		0.06 (0.06)		
Bullhead minnow	4.80 (1.63)		2.28 (1.41)		0.39 (0.23)	1.26 (0.63)		9.82 (4.12)		
Quillback	0.22 (0.08)		0.09 (0.06)		0.08 (0.08)	0.59 (0.31)	0.38 (0.17)	0.15 (0.08)		
Smallmouth buffalo	0.07 (0.03)		0.08 (0.06)		0.16 (0.16)	0.07 (0.07)		0.04 (0.04)		
Bigmouth buffalo	0.04 (0.04)				0.07 (0.07)	0.16 (0.16)				
Spotted sucker	0.27 (0.07)		0.68 (0.20)			0.10 (0.10)	0.04 (0.04)	0.04 (0.04)		
Silver redhorse	1.08 (0.22)		0.60 (0.24)		0.21 (0.15)	1.04 (0.52)	1.38 (0.46)	1.66 (0.43)		
River redhorse	0.06 (0.03)					0.15 (0.10)	0.99 (0.50)	0.06 (0.06)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
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Table 2.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by day electrofishing in Pool 8 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 2.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Golden redhorse	0.82 (0.22)		0.98 (0.52)		0.33 (0.23)	0.29 (0.19)	0.14 (0.11)	1.06 (0.34)		
Shorthead redhorse	1.88 (0.35)		1.85 (0.65)		0.80 (0.45)	0.91 (0.30)	2.66 (0.63)	2.64 (0.69)		
Yellow bullhead	0.01 (0.01)		0.02 (0.02)							
Channel catfish	0.23 (0.09)		0.25 (0.12)		0.27 (0.20)	0.25 (0.18)	0.06 (0.06)	0.20 (0.20)		
Flathead catfish	0.23 (0.07)		0.12 (0.07)		0.32 (0.18)	0.14 (0.10)	0.05 (0.05)	0.38 (0.17)		
Northern pike	0.28 (0.09)		0.38 (0.15)		0.23 (0.12)	0.07 (0.07)	0.07 (0.07)	0.32 (0.18)		
Trout-perch	0.11 (0.05)				0.08 (0.08)	0.27 (0.14)		0.11 (0.11)		
Burbot	0.06 (0.03)					0.07 (0.07)	0.04 (0.04)	0.11 (0.07)		
Brook silverside	0.15 (0.06)		0.30 (0.16)		0.18 (0.12)			0.10 (0.07)		
White bass	0.25 (0.09)		0.03 (0.03)		0.73 (0.27)	0.59 (0.34)	0.10 (0.10)	0.17 (0.12)		
Rock bass	1.35 (0.26)		2.11 (0.63)		0.92 (0.69)	0.38 (0.17)	0.09 (0.06)	1.31 (0.36)		
Green sunfish	1.23 (1.00)		3.56 (2.96)					0.06 (0.06)		
Pumpkinseed	0.14 (0.08)		0.35 (0.23)					0.05 (0.05)		
Orangespotted sunfish	0.13 (0.07)		0.28 (0.19)			0.07 (0.07)		0.06 (0.06)		
Bluegill	4.78 (2.35)		12.68 (6.91)			0.24 (0.18)		1.09 (0.50)		
Green sunfish x bluegill	0.06 (0.05)		0.17 (0.14)							
Smallmouth bass	1.30 (0.31)		0.66 (0.34)		1.40 (0.82)	2.57 (1.03)	0.72 (0.33)	1.09 (0.42)		
Largemouth bass	1.61 (0.75)		3.50 (2.18)		0.99 (0.51)	0.54 (0.26)		0.64 (0.24)		
White crappie	0.05 (0.04)		0.15 (0.12)							
Black crappie	0.47 (0.13)		0.56 (0.26)		0.83 (0.34)	0.70 (0.39)		0.22 (0.10)		
Western sand darter	0.01 (0.01)		0.04 (0.04)							
Mud darter	0.07 (0.05)		0.08 (0.06)		0.08 (0.08)			0.11 (0.11)		
Johnny darter	0.54 (0.17)		0.58 (0.24)		1.93 (1.62)	0.49 (0.32)		0.36 (0.26)		
Yellow perch	0.24 (0.08)		0.48 (0.21)		0.07 (0.07)	0.07 (0.07)		0.15 (0.11)		
Logperch	0.38 (0.13)		0.04 (0.04)		1.93 (1.14)	0.81 (0.50)	0.10 (0.10)	0.22 (0.10)		
River darter							0.42 (0.42)			
Sauger	0.89 (0.17)		0.67 (0.20)		1.31 (0.90)	0.53 (0.18)	0.24 (0.13)	1.26 (0.39)		
Walleye	0.11 (0.05)		0.08 (0.06)		0.16 (0.11)		0.15 (0.10)	0.21 (0.13)		
Sauger x walleye	0.02 (0.02)							0.06 (0.06)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by day electrofishing in Pool 8 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 2.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 3

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Freshwater drum	0.47 (0.11)		0.59 (0.18)		1.04 (0.59)	0.56 (0.33)		0.24 (0.14)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by night electrofishing in Pool 8 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 2.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Chestnut lamprey	0.11 (0.07)					0.06 (0.06)		0.24 (0.18)		
American brook lamprey							0.06 (0.06)			
Longnose gar	0.42 (0.12)		0.25 (0.16)			0.40 (0.24)	0.33 (0.18)	0.58 (0.24)		
Shortnose gar	0.10 (0.06)		0.10 (0.10)				0.03 (0.03)	0.16 (0.11)		
Bowfin	0.09 (0.09)		0.25 (0.25)							
Mooneye	0.54 (0.16)		0.44 (0.20)			1.04 (0.45)	0.58 (0.33)	0.33 (0.24)		
Gizzard shad	0.09 (0.09)							0.22 (0.22)		
Spotfin shiner	3.43 (1.84)		0.23 (0.15)			2.70 (2.05)	0.19 (0.19)	6.76 (4.45)		
Common carp	4.35 (1.63)		2.54 (1.88)			3.12 (2.29)	0.15 (0.15)	6.74 (3.46)		
Mississippi silvery minnow	0.48 (0.44)					0.18 (0.18)		1.09 (1.09)		
Silver chub	0.14 (0.09)		0.17 (0.17)			0.35 (0.27)	0.08 (0.05)			
Golden shiner	0.04 (0.04)		0.10 (0.10)							
Emerald shiner	9.58 (3.24)		12.29 (8.42)			14.05 (4.34)	0.50 (0.30)	4.50 (1.40)		
River shiner	0.71 (0.23)		0.86 (0.56)			1.12 (0.42)		0.34 (0.15)		
Spottail shiner	0.28 (0.22)		0.79 (0.61)							
Sand shiner	0.10 (0.06)					0.42 (0.26)				
Weed shiner	0.02 (0.02)					0.08 (0.08)				
Mimic shiner	0.16 (0.08)		0.13 (0.13)			0.49 (0.29)	0.06 (0.06)			
Channel shiner	0.48 (0.16)		0.33 (0.21)			0.90 (0.31)	0.11 (0.08)	0.37 (0.30)		
Pugnose minnow	0.13 (0.09)		0.35 (0.25)							
Bullhead minnow	1.28 (0.73)		1.08 (0.82)			0.08 (0.08)		2.20 (1.67)		
River carpsucker	0.11 (0.07)					0.08 (0.08)	0.09 (0.06)	0.23 (0.17)		
Quillback	1.31 (0.39)		1.22 (0.88)			1.47 (0.56)	0.38 (0.22)	1.29 (0.46)		
Highfin carpsucker							0.03 (0.03)			
White sucker							0.04 (0.04)			
Northern hog sucker							0.03 (0.03)			
Smallmouth buffalo	0.50 (0.44)		1.40 (1.23)							
Bigmouth buffalo	0.13 (0.08)		0.36 (0.23)				0.07 (0.07)			
Black buffalo	0.03 (0.03)							0.07 (0.07)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by night electrofishing in Pool 8 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 2.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Spotted sucker	0.59 (0.52)		1.58 (1.44)					0.06 (0.06)		
Silver redhorse	3.60 (0.68)		1.99 (0.67)			4.58 (1.51)	1.21 (0.59)	4.47 (1.30)		
River redhorse	0.55 (0.24)		0.33 (0.33)			1.63 (0.84)	0.93 (0.36)	0.08 (0.08)		
Golden redhorse	1.44 (0.58)		0.52 (0.26)			2.87 (1.75)	0.46 (0.40)	1.42 (0.99)		
Shorthead redhorse	7.88 (1.85)		5.50 (3.61)			13.57 (4.59)	8.61 (3.38)	6.57 (1.84)		
Channel catfish	0.74 (0.25)					1.31 (0.72)	0.80 (0.33)	1.06 (0.45)		
Tadpole madtom	0.04 (0.04)		0.10 (0.10)							
Flathead catfish	0.33 (0.12)		0.10 (0.10)			0.68 (0.34)	0.03 (0.03)	0.31 (0.21)		
Northern pike	0.12 (0.06)		0.10 (0.10)			0.20 (0.14)	0.03 (0.03)	0.08 (0.08)		
Trout-perch	0.02 (0.02)					0.09 (0.09)				
Burbot	0.04 (0.04)						0.08 (0.06)	0.10 (0.10)		
Brook silverside	0.23 (0.14)		0.46 (0.33)			0.27 (0.27)				
White bass	0.83 (0.53)		1.79 (1.45)			0.78 (0.47)	0.07 (0.07)			
Rock bass	1.15 (0.43)		0.83 (0.83)			0.50 (0.30)		1.84 (0.77)		
Green sunfish	0.02 (0.02)					0.08 (0.08)				
Orangespotted sunfish	0.29 (0.26)		0.73 (0.73)				0.06 (0.06)	0.06 (0.06)		
Bluegill	0.54 (0.42)		1.15 (1.15)			0.31 (0.25)		0.15 (0.15)		
Smallmouth bass	2.46 (0.71)		0.92 (0.62)			4.16 (1.36)	1.38 (0.52)	2.83 (1.49)		
Largemouth bass	0.07 (0.07)		0.21 (0.21)							
White crappie	0.07 (0.07)		0.21 (0.21)							
Black crappie	0.40 (0.20)		0.69 (0.51)			0.25 (0.25)		0.22 (0.12)		
Western sand darter	0.03 (0.03)					0.11 (0.11)				
Mud darter	0.03 (0.02)						0.06 (0.06)	0.06 (0.06)		
Johnny darter	0.16 (0.08)		0.15 (0.15)			0.15 (0.10)		0.19 (0.13)		
Yellow perch	0.78 (0.75)		2.08 (2.08)					0.08 (0.08)		
Logperch	0.12 (0.06)					0.25 (0.17)	0.15 (0.07)	0.16 (0.11)		
Slenderhead darter							0.06 (0.06)			
Sauger	6.29 (1.55)		2.84 (0.79)			12.23 (4.93)	0.64 (0.40)	5.84 (2.41)		
Walleye	1.25 (0.34)		0.84 (0.44)			2.26 (1.05)	1.00 (0.55)	1.01 (0.43)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by night electrofishing in Pool 8 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 2.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 3

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCEW	SCB	TRI	TWZ
Freshwater drum	3.54 (1.09)		2.35 (1.80)			6.61 (3.08)	0.51 (0.17)	2.75 (1.16)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by fyke netting in Pool 8 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 2.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar	2.68 (1.29)		2.78 (1.47)		1.99 (1.46)					
Shortnose gar	4.69 (1.29)		5.22 (1.48)		1.01 (0.57)					
Bowfin	1.11 (0.38)		1.18 (0.43)		0.67 (0.31)					
Mooneye	0.03 (0.02)				0.24 (0.17)					
Gizzard shad	0.16 (0.14)		0.19 (0.16)							
Common carp	2.57 (0.85)		2.64 (0.97)		2.08 (0.78)					
Golden shiner	0.16 (0.07)		0.18 (0.08)							
River carpsucker	0.05 (0.04)		0.06 (0.04)							
Quillback	0.07 (0.04)		0.06 (0.04)		0.08 (0.08)					
White sucker	0.04 (0.03)		0.03 (0.03)		0.08 (0.08)					
Smallmouth buffalo	0.20 (0.06)		0.19 (0.07)		0.32 (0.14)					
Spotted sucker	0.22 (0.08)		0.22 (0.09)		0.25 (0.18)					
Silver redhorse	1.55 (0.34)		1.49 (0.38)		1.96 (0.57)					
Golden redhorse	0.06 (0.04)		0.06 (0.04)		0.08 (0.08)					
Shorthead redhorse	0.53 (0.16)		0.46 (0.17)		0.97 (0.54)					
Black bullhead	0.01 (0.01)				0.08 (0.08)					
Channel catfish	0.23 (0.09)		0.15 (0.08)		0.75 (0.51)					
Flathead catfish	0.08 (0.04)		0.06 (0.04)		0.16 (0.11)					
Northern pike	0.32 (0.12)		0.34 (0.13)		0.16 (0.11)					
Brown trout	0.01 (0.01)				0.08 (0.08)					
White bass	0.61 (0.21)		0.31 (0.15)		2.64 (1.29)					
Rock bass	0.22 (0.10)		0.22 (0.11)		0.24 (0.17)					
Pumpkinseed	0.32 (0.13)		0.36 (0.15)							
Warmouth	0.03 (0.03)		0.03 (0.03)							
Orangespotted sunfish	0.13 (0.09)		0.15 (0.10)							
Bluegill	15.31 (6.26)		17.31 (7.20)		1.52 (1.04)					
Green x warmouth sunfish	0.03 (0.03)		0.03 (0.03)							
Green sunfish x bluegill	0.03 (0.03)		0.03 (0.03)							
Smallmouth bass	0.04 (0.03)		0.03 (0.03)		0.08 (0.08)					

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



Table 2.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by fyke netting in Pool 8 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 2.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Largemouth bass	0.11 (0.05)		0.12 (0.06)							
White crappie	0.88 (0.35)		0.98 (0.40)		0.17 (0.11)					
Black crappie	29.25 (6.65)		31.23 (7.59)		15.63 (6.51)					
Yellow perch	0.75 (0.32)		0.86 (0.37)							
Sauger	0.26 (0.08)		0.24 (0.09)		0.40 (0.14)					
Walleye	0.24 (0.09)		0.25 (0.10)		0.17 (0.12)					
Freshwater drum	0.99 (0.34)		0.89 (0.37)		1.73 (0.79)					

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.3.4. Mean catch-per-unit-effort and (standard error) for fishes collected by tandem fyke netting in Pool 8 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 2.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar	0.15 (0.13)	1.19 (1.09)								
Shortnose gar	0.09 (0.06)	0.77 (0.49)								
Bowfin	0.15 (0.06)	1.24 (0.52)								
Mooneye	0.14 (0.09)			0.16 (0.10)						
Common carp	0.23 (0.15)	1.26 (1.07)		0.09 (0.09)						
River carpsucker	0.02 (0.02)	0.17 (0.17)								
Quillback	0.02 (0.02)	0.17 (0.17)								
Smallmouth buffalo	0.06 (0.06)	0.51 (0.51)								
Spotted sucker	0.10 (0.05)	0.78 (0.43)								
Silver redhorse	0.36 (0.19)	1.69 (0.90)		0.17 (0.17)						
Golden redhorse	0.02 (0.02)	0.17 (0.17)								
Shorthead redhorse	1.02 (0.45)	0.66 (0.24)		1.07 (0.51)						
Channel catfish	0.08 (0.08)	0.08 (0.08)		0.09 (0.09)						
Flathead catfish	0.08 (0.07)	0.09 (0.09)		0.08 (0.08)						
Northern pike	0.06 (0.03)	0.52 (0.28)								
White bass	0.35 (0.14)	0.61 (0.39)		0.31 (0.15)						
Yellow bass	0.01 (0.01)	0.09 (0.09)								
Rock bass	0.07 (0.07)			0.09 (0.09)						
Green sunfish	0.01 (0.01)	0.08 (0.08)								
Pumpkinseed	0.04 (0.04)	0.32 (0.32)								
Orangespotted sunfish	0.05 (0.05)	0.38 (0.38)								
Bluegill	0.21 (0.09)	1.68 (0.72)								
Smallmouth bass	0.01 (0.01)	0.08 (0.08)								
Largemouth bass	0.01 (0.01)	0.09 (0.09)								
White crappie	0.35 (0.25)	2.81 (2.01)								
Black crappie	3.64 (1.81)	28.33 (14.62)		0.17 (0.17)						
Black x white crappie	0.01 (0.01)	0.08 (0.08)								
Yellow perch	0.08 (0.05)	0.66 (0.39)								
Sauger	0.10 (0.07)	0.24 (0.16)		0.08 (0.08)						

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.3.4. Mean catch-per-unit-effort and (standard error) for fishes collected by tandem fyke netting in Pool 8 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 2.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Walleye	0.29 (0.14)			0.33 (0.17)						
Freshwater drum	1.87 (0.83)	4.50 (2.85)		1.50 (0.85)						

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by mini fyke netting in Pool 8 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 2.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar	0.08 (0.04)		0.04 (0.04)		0.09 (0.09)	0.08 (0.08)		0.11 (0.07)		
Shortnose gar	0.13 (0.08)		0.36 (0.23)		0.17 (0.11)					
Bowfin	0.01 (0.01)		0.04 (0.04)							
Gizzard shad	0.10 (0.05)		0.25 (0.14)		0.34 (0.19)					
Spotfin shiner	8.27 (2.51)		7.49 (3.93)		11.75 (10.47)	6.42 (4.47)	1.17 (1.00)	9.69 (4.75)		
Common carp	0.02 (0.02)							0.05 (0.05)		
Mississippi silvery minnow	0.08 (0.04)		0.04 (0.04)		0.09 (0.09)	0.17 (0.11)		0.05 (0.05)		
Golden shiner	0.14 (0.07)		0.24 (0.17)		0.09 (0.09)	0.08 (0.08)		0.11 (0.11)		
Emerald shiner	2.72 (1.32)		4.19 (3.51)		1.19 (0.48)	3.68 (2.21)		1.02 (0.63)		
River shiner	0.38 (0.14)		0.31 (0.24)		0.58 (0.26)	1.07 (0.48)				
Spottail shiner	0.01 (0.01)				0.26 (0.26)		0.08 (0.08)			
Sand shiner	0.02 (0.02)							0.05 (0.05)		
Weed shiner	1.28 (0.63)		1.66 (1.58)			1.26 (0.91)		1.12 (0.68)		
Mimic shiner	0.03 (0.02)		0.04 (0.04)			0.08 (0.08)				
Channel shiner	0.18 (0.06)		0.08 (0.06)		0.34 (0.20)	0.40 (0.18)	0.09 (0.09)	0.11 (0.11)		
Pugnose minnow	8.92 (3.57)		9.42 (4.38)		0.68 (0.29)	2.03 (0.70)	0.41 (0.41)	13.77 (8.59)		
Fathead minnow	0.09 (0.05)		0.04 (0.04)			0.25 (0.18)	0.08 (0.08)	0.05 (0.05)		
Bullhead minnow	1.60 (0.56)		1.13 (0.36)		1.20 (0.78)	0.16 (0.11)	0.68 (0.36)	2.96 (1.44)		
Quillback	0.06 (0.03)		0.04 (0.04)		0.08 (0.08)	0.08 (0.08)		0.05 (0.05)		
Smallmouth buffalo	0.01 (0.01)		0.04 (0.04)							
Shorthead redhorse	0.14 (0.05)		0.04 (0.04)		0.16 (0.11)	0.25 (0.13)	0.25 (0.13)	0.16 (0.11)		
Yellow bullhead	0.02 (0.02)					0.08 (0.08)				
Tadpole madtom	0.38 (0.20)		0.21 (0.08)			0.17 (0.11)		0.71 (0.51)		
Flathead catfish					0.09 (0.09)		0.08 (0.08)			
Northern pike	0.36 (0.13)		0.48 (0.23)			0.08 (0.08)		0.48 (0.27)		
Central mudminnow	0.12 (0.10)		0.29 (0.29)					0.05 (0.05)		
Rainbow smelt	0.02 (0.02)					0.08 (0.08)				
Burbot	0.02 (0.02)							0.05 (0.05)		
Brook silverside	0.06 (0.03)		0.04 (0.04)		0.09 (0.09)			0.11 (0.08)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by mini fyke netting in Pool 8 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 2.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
White bass	0.60 (0.50)		0.08 (0.06)		1.03 (0.77)	0.08 (0.08)		1.32 (1.32)		
Rock bass	0.30 (0.10)		0.45 (0.24)		0.08 (0.08)		0.09 (0.09)	0.37 (0.17)		
Green sunfish	0.15 (0.06)		0.28 (0.15)		0.33 (0.19)	0.17 (0.11)	0.17 (0.17)			
Pumpkinseed	0.11 (0.08)		0.33 (0.25)							
Warmouth	0.04 (0.04)		0.12 (0.12)							
Orangespotted sunfish	0.13 (0.07)		0.32 (0.20)					0.06 (0.06)		
Bluegill	28.57 (12.80)		47.49 (23.26)		3.21 (1.67)	5.84 (4.29)	0.44 (0.44)	28.83 (26.56)		
Largemouth bass	0.07 (0.04)		0.20 (0.13)							
White crappie	0.09 (0.04)		0.08 (0.08)			0.17 (0.11)		0.05 (0.05)		
Black crappie	0.48 (0.21)		1.14 (0.61)		0.33 (0.19)	0.25 (0.13)		0.05 (0.05)		
Western sand darter	0.02 (0.02)					0.08 (0.08)				
Mud darter	0.36 (0.13)		0.63 (0.31)		0.08 (0.08)		0.35 (0.20)	0.36 (0.21)		
Iowa darter	0.01 (0.01)		0.04 (0.04)							
Johnny darter	1.01 (0.40)		2.05 (1.13)		0.43 (0.24)	0.17 (0.11)	0.26 (0.19)	0.67 (0.26)		
Logperch	0.13 (0.11)						0.34 (0.34)	0.35 (0.29)		
Slenderhead darter	0.02 (0.02)					0.08 (0.08)				
River darter	0.06 (0.06)							0.16 (0.16)		
Sauger	0.07 (0.03)		0.08 (0.06)		0.17 (0.12)	0.16 (0.11)	0.08 (0.08)			
Walleye	0.04 (0.03)		0.04 (0.04)		0.16 (0.11)			0.06 (0.06)		
Freshwater drum	0.16 (0.06)		0.12 (0.09)		0.41 (0.22)	0.17 (0.12)	0.17 (0.12)	0.15 (0.11)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.3.6. Mean catch-per-unit-effort and (standard error) for fishes collected by tandem mini fyke netting in Pool 8 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 2.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Spotfin shiner	0.25 (0.17)	1.42 (1.23)		0.08 (0.08)						
Common carp	0.07 (0.07)			0.08 (0.08)						
Golden shiner	0.01 (0.01)	0.08 (0.08)								
Emerald shiner	0.04 (0.03)	0.34 (0.21)								
Weed shiner	0.02 (0.01)	0.16 (0.10)								
Channel shiner	0.20 (0.14)			0.23 (0.16)						
Pugnose minnow	0.17 (0.11)	0.81 (0.63)		0.08 (0.08)						
Bullhead minnow	0.02 (0.02)	0.17 (0.17)								
Shorthead redhorse	0.08 (0.07)	0.08 (0.08)		0.08 (0.08)						
Brown bullhead	0.01 (0.01)	0.08 (0.08)								
Tadpole madtom	0.01 (0.01)	0.08 (0.08)								
Flathead catfish	0.01 (0.01)	0.08 (0.08)								
Trout-perch	0.04 (0.04)	0.35 (0.35)								
White bass	0.01 (0.01)	0.08 (0.08)								
Bluegill	0.18 (0.14)	0.32 (0.24)		0.16 (0.16)						
Smallmouth bass	0.01 (0.01)	0.08 (0.08)								
Black crappie	0.01 (0.01)	0.08 (0.08)								
Mud darter	0.02 (0.02)	0.16 (0.16)								
Johnny darter	0.01 (0.01)	0.08 (0.08)								
Logperch	0.07 (0.07)			0.08 (0.08)						
Slenderhead darter	0.01 (0.01)	0.09 (0.09)								
River darter	0.07 (0.07)			0.08 (0.08)						
Freshwater drum	0.18 (0.16)	0.17 (0.17)		0.18 (0.18)						

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.3.7. Mean catch-per-unit-effort and (standard error) for fishes collected by small hoop netting in Pool 8 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 2.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Common carp	0.21 (0.10)	0.29 (0.14)		0.25 (0.17)		0.12 (0.06)		0.08 (0.06)		
Smallmouth buffalo	0.01 (0.01)					0.08 (0.05)				
Spotted sucker		0.04 (0.04)								
Silver redhorse	0.01 (0.01)					0.04 (0.04)	0.12 (0.12)	0.04 (0.04)		
Golden redhorse	0.02 (0.02)			0.04 (0.04)						
Shorthead redhorse	0.39 (0.16)	0.08 (0.06)		0.37 (0.25)		0.62 (0.25)	0.99 (0.73)	0.45 (0.24)		
Yellow bullhead	0.01 (0.01)	0.16 (0.11)								
Channel catfish	1.23 (0.63)	0.58 (0.27)		1.60 (1.02)		0.93 (0.42)	1.24 (0.53)	0.45 (0.19)		
Flathead catfish		0.04 (0.04)								
Rock bass	0.03 (0.02)	0.04 (0.04)						0.16 (0.09)		
Bluegill	0.01 (0.01)	0.08 (0.08)								
Smallmouth bass	0.02 (0.02)			0.04 (0.04)						
Black crappie	0.03 (0.01)	0.13 (0.09)					0.04 (0.04)	0.08 (0.06)		
Yellow perch		0.04 (0.04)								
Sauger		0.04 (0.04)								
Walleye	0.03 (0.03)			0.04 (0.04)						
Freshwater drum	0.11 (0.05)			0.13 (0.07)		0.33 (0.21)	0.04 (0.04)			

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.3.8. Mean catch-per-unit-effort and (standard error) for fishes collected by large hoop netting in Pool 8 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 2.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar	0.01 (0.00)	0.08 (0.06)								
Shortnose gar		0.04 (0.04)								
Gizzard shad		0.04 (0.04)								
Common carp	0.52 (0.21)	0.46 (0.17)		0.66 (0.33)		0.04 (0.04)		0.37 (0.22)		
Quillback		0.04 (0.04)								
Smallmouth buffalo	0.91 (0.26)	0.12 (0.06)		1.20 (0.41)		0.88 (0.45)	0.25 (0.10)	0.33 (0.13)		
Spotted sucker		0.04 (0.04)								
Silver redhorse	0.14 (0.05)	0.21 (0.17)		0.16 (0.07)		0.04 (0.04)	0.12 (0.06)	0.08 (0.05)		
River redhorse	0.03 (0.03)			0.04 (0.04)						
Golden redhorse							0.04 (0.04)			
Shorthead redhorse	0.25 (0.11)			0.29 (0.17)		0.32 (0.12)	0.29 (0.14)	0.20 (0.11)		
Brown bullhead		0.04 (0.04)								
Channel catfish	0.61 (0.24)	0.75 (0.25)		0.64 (0.38)		0.40 (0.27)		0.57 (0.28)		
Flathead catfish	0.07 (0.03)			0.04 (0.04)		0.16 (0.07)	0.12 (0.09)	0.13 (0.09)		
Northern pike	0.04 (0.03)	0.04 (0.04)		0.04 (0.04)				0.04 (0.04)		
White bass	0.10 (0.08)			0.17 (0.13)						
Bluegill	0.05 (0.03)	0.53 (0.29)						0.04 (0.04)		
Smallmouth bass	0.02 (0.02)			0.04 (0.04)						
Black crappie	0.07 (0.03)	0.41 (0.23)				0.08 (0.05)	0.04 (0.04)	0.12 (0.09)		
Walleye	0.01 (0.01)	0.04 (0.04)						0.04 (0.04)		
Freshwater drum	0.27 (0.18)			0.33 (0.29)		0.33 (0.16)		0.13 (0.13)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



Table 2.3.9. Mean catch-per-unit-effort and (standard error) for fishes collected by seining in Pool 8 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 2.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar	0.05 (0.03)		0.09 (0.05)					0.04 (0.04)		
Bowfin	0.01 (0.01)		0.03 (0.03)							
Gizzard shad	0.47 (0.25)		0.97 (0.66)			0.18 (0.18)		0.21 (0.15)		
Spotfin shiner	45.13 (11.66)		5.63 (2.07)			27.00 (8.29)		91.63 (28.79)		
Brassy minnow	0.01 (0.01)					0.03 (0.03)				
Mississippi silvery minnow	2.49 (0.91)		2.03 (0.91)			3.63 (2.88)		2.21 (1.24)		
Golden shiner	0.08 (0.03)		0.22 (0.09)			0.03 (0.03)				
Pallid shiner	0.04 (0.03)		0.03 (0.03)			0.10 (0.10)				
Emerald shiner	13.92 (2.85)		12.94 (4.56)			17.65 (7.01)		12.54 (4.08)		
River shiner	3.32 (0.88)		1.16 (0.43)			9.00 (3.17)		1.83 (1.04)		
Spottail shiner	0.29 (0.10)		0.66 (0.27)			0.23 (0.09)				
Sand shiner	0.01 (0.01)					0.05 (0.03)				
Weed shiner	0.43 (0.16)		0.72 (0.36)			0.63 (0.41)		0.04 (0.04)		
Mimic shiner	0.26 (0.08)		0.09 (0.09)			0.13 (0.06)		0.50 (0.19)		
Channel shiner	0.93 (0.30)		0.19 (0.09)			0.35 (0.15)		1.96 (0.73)		
Pugnose minnow	2.21 (0.97)		5.28 (2.68)			0.25 (0.13)		0.63 (0.38)		
Bluntnose minnow	0.02 (0.02)							0.04 (0.04)		
Fathead minnow	0.98 (0.50)		0.13 (0.06)			0.38 (0.13)		2.13 (1.26)		
Bullhead minnow	3.78 (1.48)		3.03 (0.92)			2.55 (0.70)		5.21 (3.60)		
Quillback	0.81 (0.52)					3.30 (2.19)		0.04 (0.04)		
Smallmouth buffalo	0.01 (0.01)		0.03 (0.03)							
Spotted sucker	1.14 (0.59)		3.19 (1.65)							
Silver redhorse	0.05 (0.03)		0.06 (0.06)			0.10 (0.05)				
Golden redhorse	0.02 (0.02)		0.06 (0.04)							
Shorthead redhorse	0.11 (0.04)		0.25 (0.09)			0.03 (0.03)		0.04 (0.04)		
Channel catfish	0.01 (0.01)					0.03 (0.03)				
Tadpole madtom	0.58 (0.42)		1.63 (1.16)							
Flathead catfish	0.02 (0.02)							0.04 (0.04)		
Northern pike	0.06 (0.03)		0.16 (0.08)			0.03 (0.03)				

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.3.9. Mean catch-per-unit-effort and (standard error) for fishes collected by seining in Pool 8 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 2.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCEW	SCB	TRI	TWZ
Trout-perch	0.02 (0.01)					0.08 (0.06)				
Brook silverside	0.43 (0.15)		1.06 (0.43)			0.13 (0.06)		0.04 (0.04)		
White bass	0.04 (0.02)		0.13 (0.06)							
Rock bass	0.11 (0.06)		0.06 (0.04)					0.21 (0.13)		
Green sunfish	0.04 (0.03)		0.09 (0.07)			0.03 (0.03)				
Bluegill	8.15 (3.12)		22.56 (8.72)			0.15 (0.08)		0.04 (0.04)		
Smallmouth bass	0.02 (0.01)					0.08 (0.04)				
Largemouth bass	0.19 (0.08)		0.53 (0.22)							
White crappie	0.01 (0.01)					0.03 (0.03)				
Black crappie	0.35 (0.13)		0.81 (0.36)			0.05 (0.03)		0.13 (0.09)		
Crystal darter	0.01 (0.01)					0.05 (0.03)				
Western sand darter	0.63 (0.19)					2.33 (0.76)		0.17 (0.10)		
Mud darter	0.26 (0.08)		0.31 (0.16)			0.05 (0.03)		0.33 (0.12)		
Johnny darter	1.66 (0.38)		1.97 (0.60)			0.50 (0.16)		2.08 (0.78)		
Yellow perch	0.10 (0.04)		0.28 (0.12)							
Logperch	0.20 (0.07)		0.25 (0.09)			0.18 (0.11)		0.17 (0.13)		
Slenderhead darter	0.25 (0.19)							0.63 (0.47)		
River darter	0.04 (0.02)					0.03 (0.03)		0.08 (0.06)		
Sauger	0.07 (0.02)		0.13 (0.06)			0.10 (0.05)				
Walleye	0.02 (0.02)							0.04 (0.04)		
Freshwater drum	0.06 (0.04)		0.16 (0.10)							

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.3.10. Mean catch-per-unit-effort and (standard error) for fishes collected by gill netting in Pool 8 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 2.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shovelnose sturgeon	0.10 (0.10)							0.50 (0.50)		
Longnose gar	0.05 (0.05)			0.08 (0.08)						
Mooneye	0.12 (0.08)			0.17 (0.12)						
Common carp	0.38 (0.16)			0.51 (0.24)				0.15 (0.15)		
Bigmouth buffalo	0.03 (0.03)							0.16 (0.16)		
Silver redhorse	0.15 (0.08)			0.17 (0.11)				0.15 (0.15)		
Shorthead redhorse	0.14 (0.08)			0.17 (0.11)				0.15 (0.15)		
Channel catfish	0.11 (0.11)			0.17 (0.17)						
Northern pike	0.09 (0.09)							0.46 (0.46)		
White bass	0.05 (0.05)			0.08 (0.08)						
Smallmouth bass	0.06 (0.06)			0.09 (0.09)						
Freshwater drum	0.33 (0.13)			0.49 (0.19)						

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.4.1. Mean catch-per-unit-effort and (standard error) for fishes collected by day electrofishing in Pool 8 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Chestnut lamprey		0.30 (0.30)							
Gizzard shad		0.50 (0.39)							
Spotfin shiner		37.93 (18.54)							
Common carp		1.19 (0.78)							
Emerald shiner		15.75 (6.75)							
River shiner		0.22 (0.22)							
Spottail shiner		0.11 (0.11)							
Weed shiner		0.11 (0.11)							
Channel shiner		0.24 (0.15)							
Pugnose minnow		0.33 (0.23)							
Bullhead minnow		9.01 (5.45)							
Quillback		0.32 (0.16)							
White sucker		0.25 (0.16)							
Smallmouth buffalo		0.13 (0.13)							
Spotted sucker		1.09 (0.54)							
Silver redhorse		1.54 (0.42)							
River redhorse		0.11 (0.11)							
Golden redhorse		2.83 (1.07)							
Shorthead redhorse		2.81 (1.38)							
Northern pike		1.24 (0.43)							
Trout-perch		0.11 (0.11)							
Brook silverside		0.24 (0.15)							
White bass		0.24 (0.15)							
Rock bass		1.13 (0.70)							
Green sunfish		1.04 (0.50)							
Pumpkinseed		0.10 (0.10)							
Orangespotted sunfish		0.44 (0.33)							
Bluegill		10.45 (3.73)							
Smallmouth bass		1.26 (0.48)							
Largemouth bass		9.18 (2.89)							

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.4.1. Mean catch-per-unit-effort and (standard error) for fishes collected by day electrofishing in Pool 8 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 2

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Black crappie		1.11 (0.52)							
Mud darter		0.36 (0.26)							
Johnny darter		1.07 (0.50)							
Yellow perch		1.86 (0.96)							
Logperch		0.42 (0.22)							
Sauger		4.42 (1.31)							
Walleye		1.27 (0.69)							
Freshwater drum		0.55 (0.55)							

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.4.2. Mean catch-per-unit-effort and (standard error) for fishes collected by night electrofishing in Pool 8 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Chestnut lamprey									0.16
Longnose gar									(0.16)
Shortnose gar									0.97
Bowfin									(0.43)
Mooneye									0.28
Gizzard shad									(0.19)
Spotfin shiner									0.38
Common carp									(0.17)
Emerald shiner									0.14
River shiner									(0.09)
Channel shiner									0.05
River carpsucker									(0.05)
Quillback									0.43
Highfin carpsucker									(0.22)
White sucker									4.92
Smallmouth buffalo									(1.93)
Spotted sucker									6.49
Silver redhorse									(3.56)
River redhorse									1.66
Golden redhorse									(0.68)
Shorthead redhorse									0.24
Yellow bullhead									(0.13)
Channel catfish									0.39
Flathead catfish									(0.18)
Northern pike									1.03
Burbot									(0.28)
Brook silverside									0.07
White bass									(0.07)
Rock bass									0.05
Green sunfish									(0.05)

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.4.2. Mean catch-per-unit-effort and (standard error) for fishes collected by night electrofishing in Pool 8 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 2

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Pumpkinseed									0.07 (0.07)
Warmouth									0.12 (0.08)
Orangespotted sunfish									0.07 (0.07)
Bluegill									2.93 (1.23)
Smallmouth bass									12.31 (3.87)
Largemouth bass									1.47 (0.66)
White crappie									0.51 (0.26)
Black crappie									2.07 (0.56)
Mud darter									0.14 (0.09)
Johnny darter									0.07 (0.07)
Yellow perch									2.98 (2.02)
Logperch									0.55 (0.23)
River darter									0.07 (0.07)
Sauger									29.67 (6.58)
Walleye									3.81 (0.79)
Freshwater drum									16.07 (5.55)

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.4.3. Mean catch-per-unit-effort and (standard error) for fishes collected by fyke netting in Pool 8 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shortnose gar		0.12 (0.12)							
Common carp		0.12 (0.12)							
Golden shiner		0.35 (0.24)							
Golden redhorse		0.12 (0.12)							
Channel catfish		0.34 (0.24)							
Northern pike		0.12 (0.12)							
White bass		0.46 (0.35)							
Rock bass		1.53 (0.83)							
Green sunfish		0.12 (0.12)							
Pumpkinseed		1.42 (0.93)							
Orangespotted sunfish		0.11 (0.11)							
Bluegill		28.20 (10.83)							
Largemouth bass		0.24 (0.16)							
White crappie		0.24 (0.16)							
Black crappie		21.89 (7.65)							
Yellow perch		3.91 (1.91)							
Sauger		0.12 (0.12)							
Freshwater drum		0.12 (0.12)							

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



Table 2.4.4. Mean catch-per-unit-effort and (standard error) for fishes collected by mini fyke netting in Pool 8 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Spotfin shiner									18.22 (12.96)
Mississippi silvery minnow									0.16 (0.16)
Emerald shiner									3.29 (2.29)
Spottail shiner									0.16 (0.16)
Weed shiner									0.98 (0.50)
Channel shiner									0.49 (0.33)
Pugnose minnow									2.29 (2.29)
Fathead minnow									0.17 (0.17)
Bullhead minnow									0.33 (0.21)
Shorthead redhorse									0.16 (0.16)
Northern pike									0.18 (0.18)
Burbot									0.17 (0.17)
Green sunfish									0.52 (0.37)
Warmouth									0.16 (0.16)
Bluegill									8.08 (7.24)
Green x warmouth sunfish									0.18 (0.18)
Largemouth bass									0.54 (0.37)
Yellow perch									0.50 (0.34)
Logperch									0.18 (0.18)
River darter									0.16 (0.16)
Sauger									0.67 (0.21)
Walleye									0.18 (0.18)

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.4.5. Mean catch-per-unit-effort and (standard error) for fishes collected by small hoop netting in Pool 8 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Channel catfish									1.12 (0.86)
Flathead catfish									0.41 (0.32)
Rock bass									0.16 (0.10)
Black crappie									0.08 (0.08)
Freshwater drum									0.16 (0.10)

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.4.6. Mean catch-per-unit-effort and (standard error) for fishes collected by large hoop netting in Pool 8 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Smallmouth buffalo									0.17 (0.17)
Silver redhorse									1.15 (0.97)
Shorthead redhorse									0.41 (0.32)
Channel catfish									0.49 (0.34)
Flathead catfish									0.66 (0.21)
White bass									0.08 (0.08)
Rock bass									0.08 (0.08)
Bluegill									0.08 (0.08)
White crappie									0.08 (0.08)
Black crappie									0.74 (0.47)
Walleye									0.16 (0.10)
Freshwater drum									1.39 (0.67)

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.4.7. Mean catch-per-unit-effort and (standard error) for fishes collected by seining in Pool 8 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Chestnut lamprey									0.08 (0.08)
Skipjack herring									0.08 (0.08)
Gizzard shad		0.50 (0.50)							2.83 (2.31)
Spotfin shiner		44.38 (21.56)							19.25 (7.87)
Common carp									0.08 (0.08)
Mississippi silvery minnow		0.13 (0.13)							0.67 (0.36)
Emerald shiner		24.50 (19.34)							12.00 (4.06)
River shiner									4.00 (2.63)
Spottail shiner		0.13 (0.13)							
Sand shiner									0.08 (0.08)
Weed shiner		0.13 (0.13)							0.42 (0.42)
Mimic shiner		0.38 (0.38)							1.50 (1.01)
Channel shiner		0.25 (0.25)							1.75 (1.19)
Pugnose minnow		1.13 (0.61)							4.08 (3.99)
Fathead minnow		0.13 (0.13)							
Bullhead minnow		6.38 (4.89)							1.92 (1.57)
Tadpole madtom		0.13 (0.13)							
Northern pike		0.13 (0.13)							0.33 (0.22)
Brook silverside		6.00 (3.81)							1.58 (0.80)
Rock bass									0.25 (0.18)
Green sunfish									0.17 (0.11)
Warmouth									0.25 (0.18)
Orangespotted sunfish		0.13 (0.13)							
Bluegill		6.50 (5.94)							7.17 (7.08)
Smallmouth bass									0.50 (0.34)
Largemouth bass		0.25 (0.16)							0.33 (0.33)
Black crappie									0.25 (0.18)
Western sand darter									0.08 (0.08)
Mud darter		0.50 (0.27)							
Johnny darter		2.38 (0.98)							1.33 (0.84)

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.4.7. Mean catch-per-unit-effort and (standard error) for fishes collected by seining in Pool 8 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 2

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Yellow perch		0.13 (0.13)							0.08 (0.08)
Logperch		0.13 (0.13)							0.08 (0.08)
River darter									0.08 (0.08)
Sauger									0.25 (0.13)

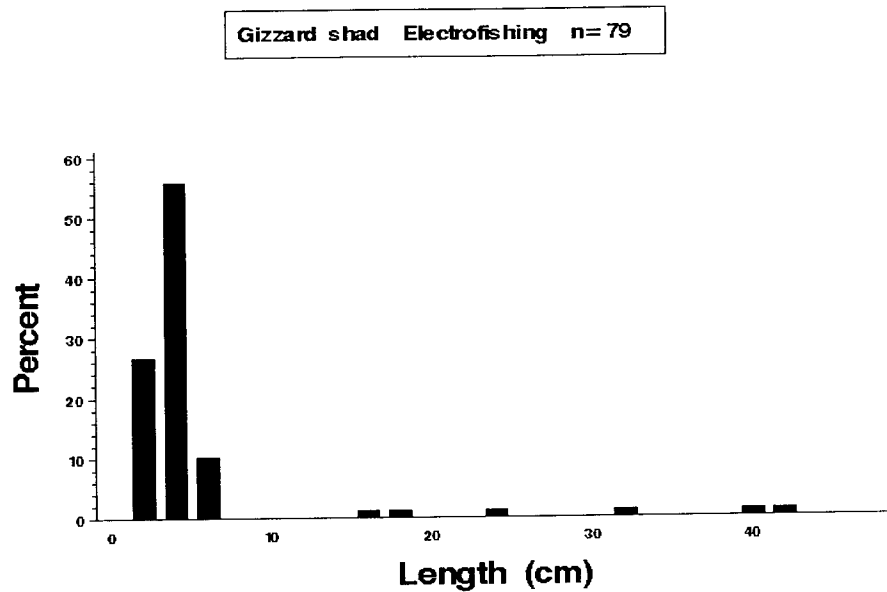
Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 2.4.8. Mean catch-per-unit-effort and (standard error) for fishes collected by bottom trawling in Pool 8 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

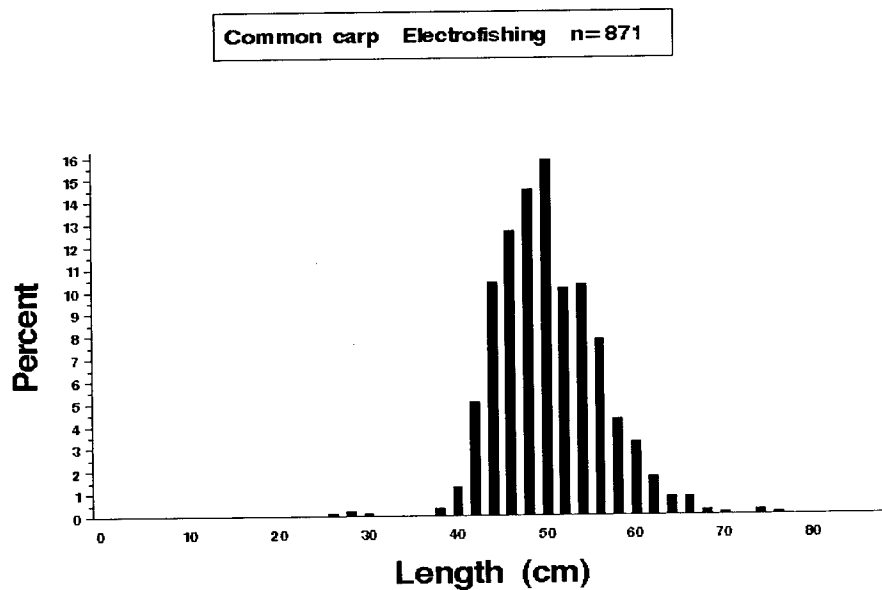
Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shovelnose sturgeon									1.08 (1.00)
Mooneye									0.25 (0.25)
Shorthead redhorse									0.42 (0.29)
Channel catfish									2.67 (1.40)
Sauger									0.08 (0.08)
Freshwater drum									0.33 (0.14)

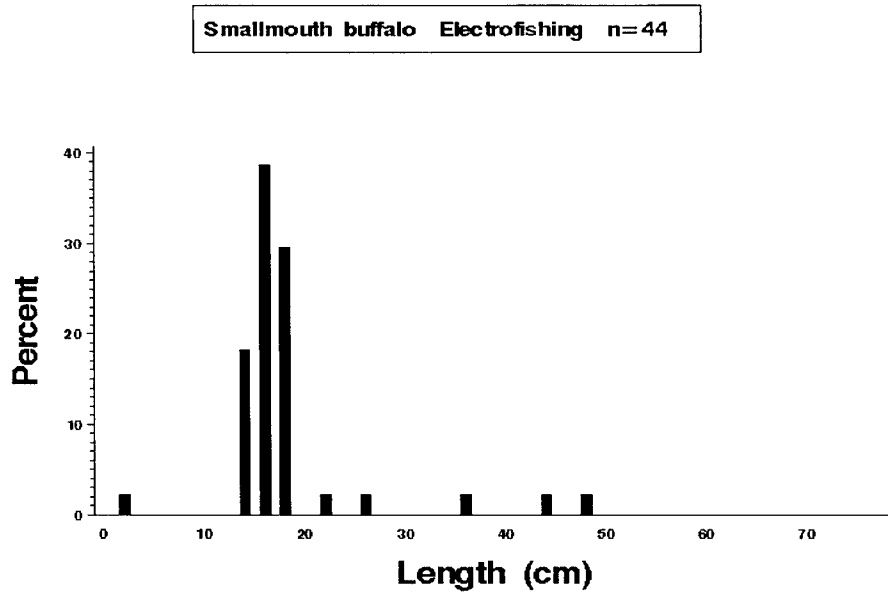
Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



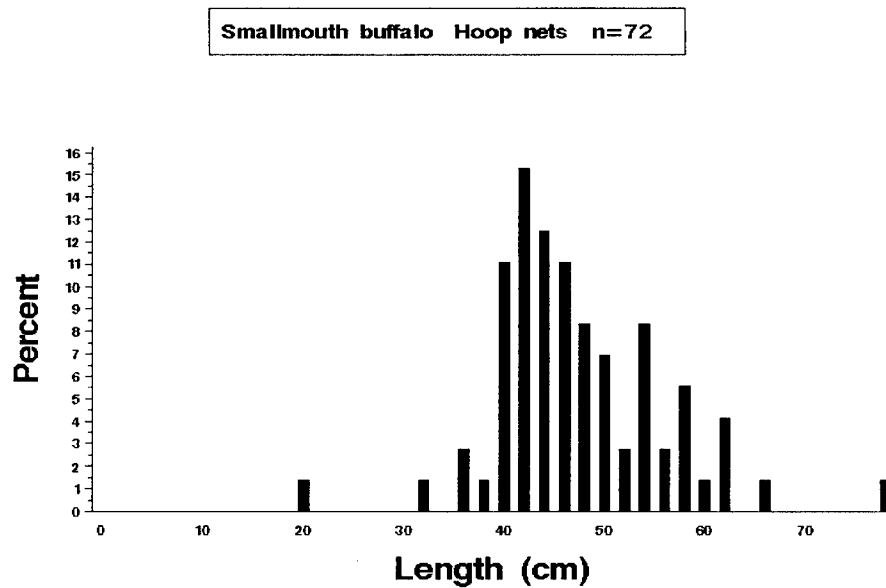
**Figure 2.2.** Length distributions (*length*) as a percentage of catch (*percent*) for gizzard shad (*Dorosoma cepedianum*) collected by electrofishing in Upper Mississippi River Pool 8 during 1993.



**Figure 2.3.** Length distributions (*length*) as a percentage of catch (*percent*) for common carp (*Cyprinus carpio*) collected by electrofishing in Upper Mississippi River Pool 8 during 1993.

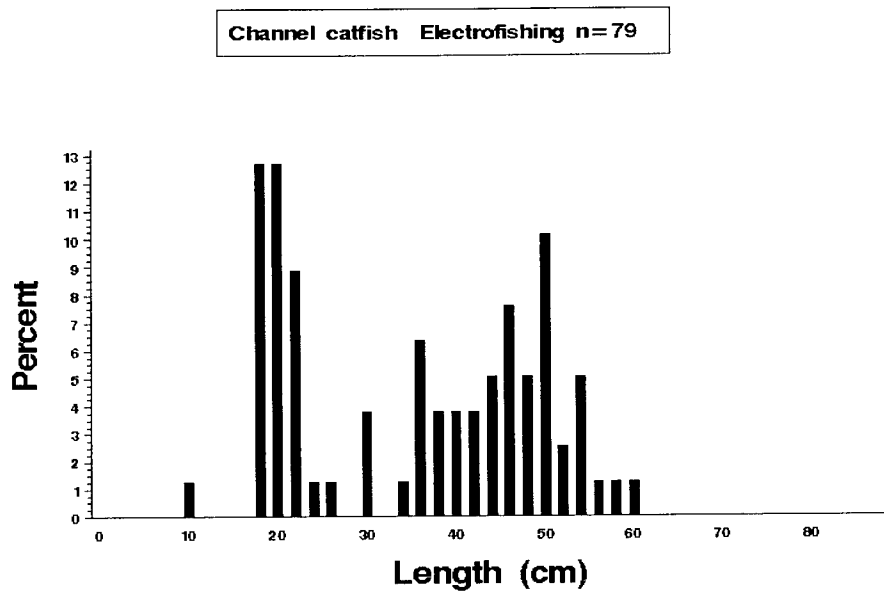


**Figure 2.4.** Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by electrofishing in Upper Mississippi River Pool 8 during 1993.

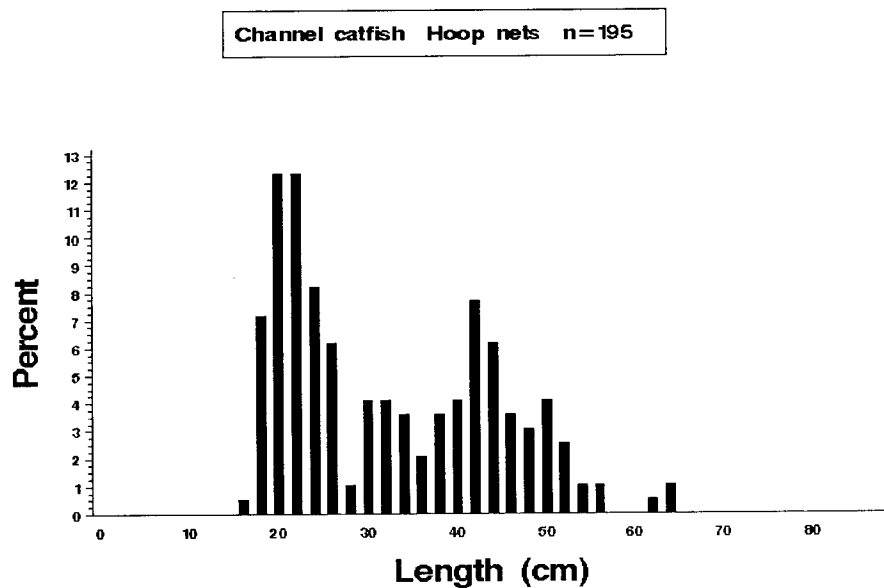


**Figure 2.5.** Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by large and small hoop netting in Upper Mississippi River Pool 8 during 1993.

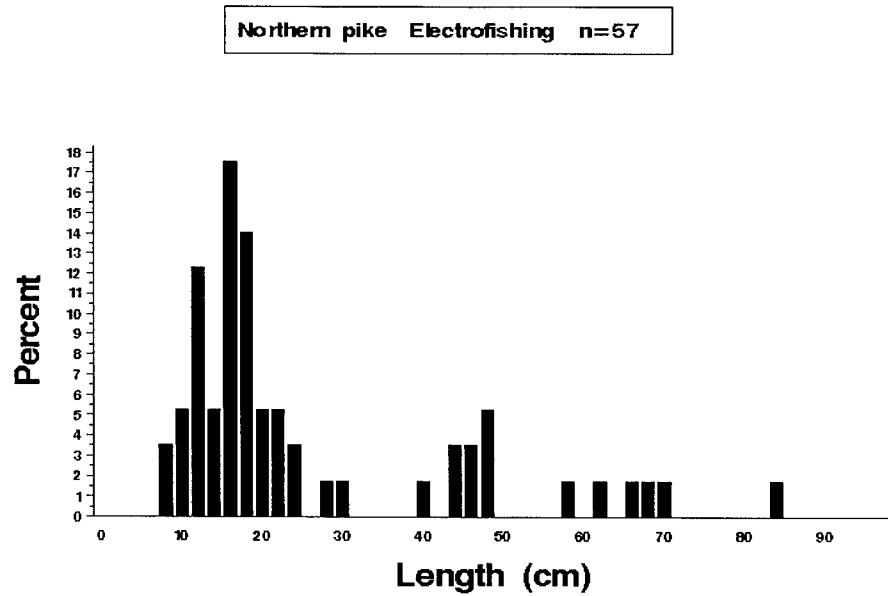




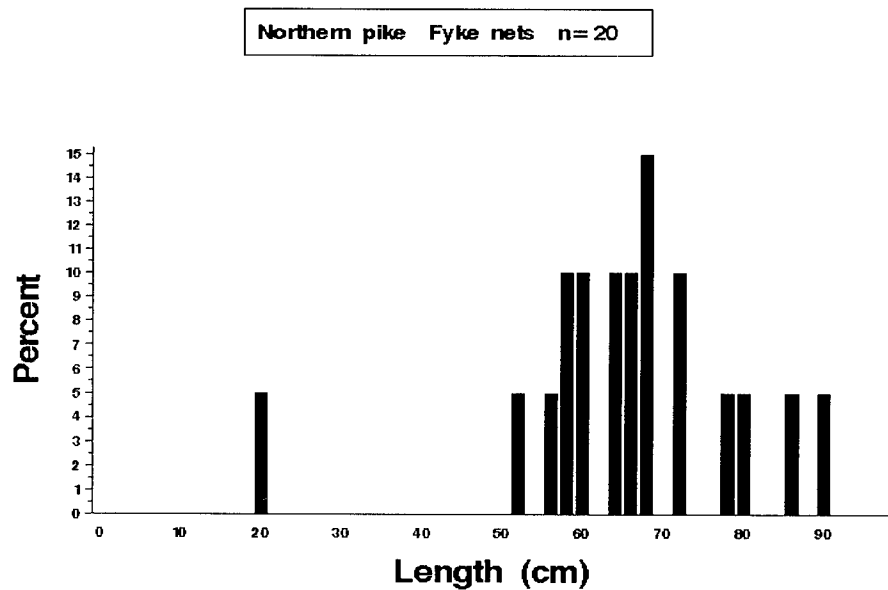
**Figure 2.6.** Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by electrofishing in Upper Mississippi River Pool 8 during 1993.



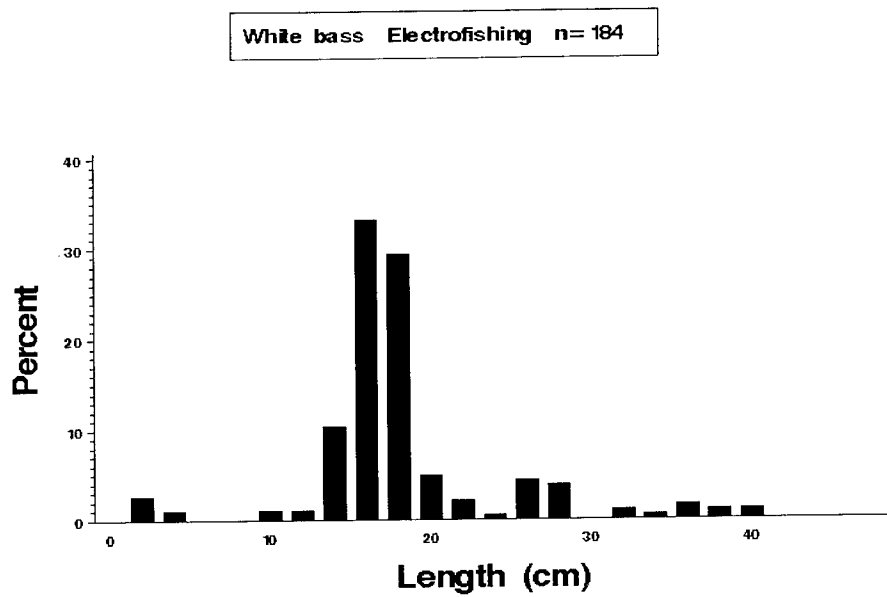
**Figure 2.7.** Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by large and small hoop netting in Upper Mississippi River Pool 8 during 1993.



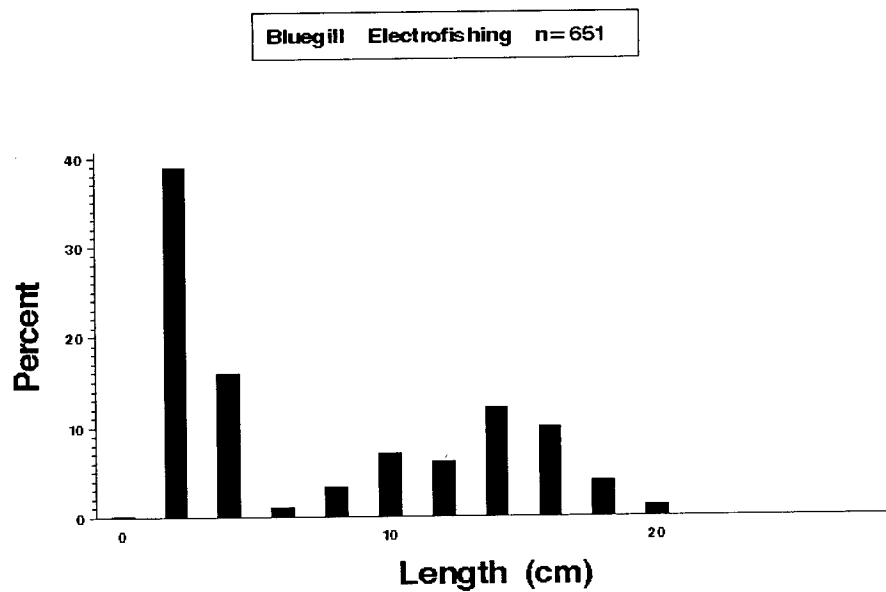
**Figure 2.8.** Length distributions (*length*) as a percentage of catch (*percent*) for northern pike (*Esox lucius*) collected by electrofishing in Upper Mississippi River Pool 8 during 1993.



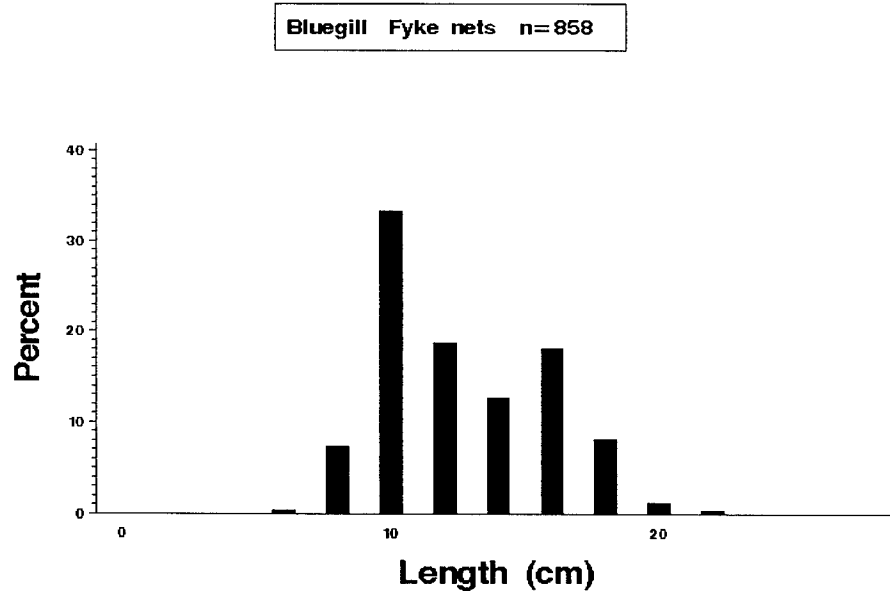
**Figure 2.9.** Length distributions (*length*) as a percentage of catch (*percent*) for northern pike (*Esox lucius*) collected by fyke netting in Upper Mississippi River Pool 8 during 1993.



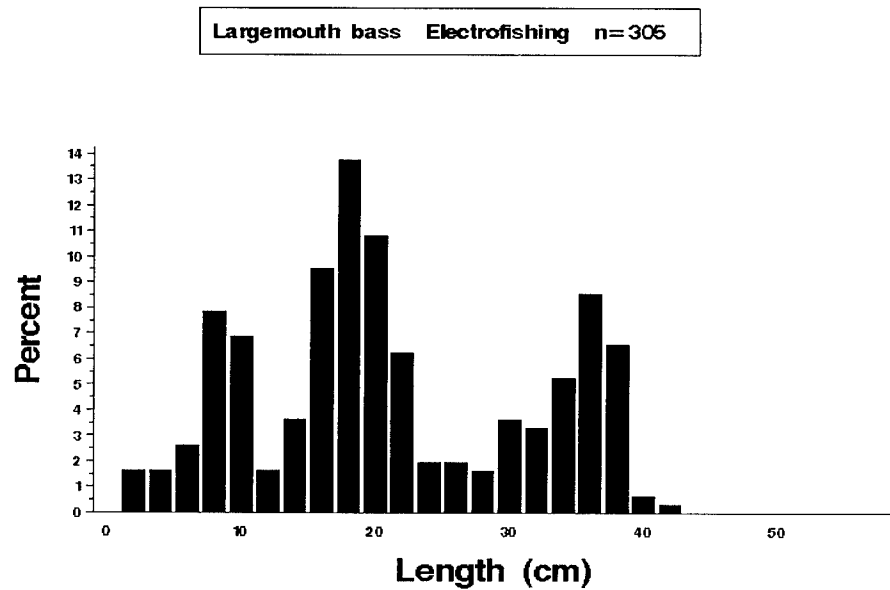
**Figure 2.10.** Length distributions (*length*) as a percentage of catch (*percent*) for white bass (*Morone chrysops*) collected by electrofishing in Upper Mississippi River Pool 8 during 1993.



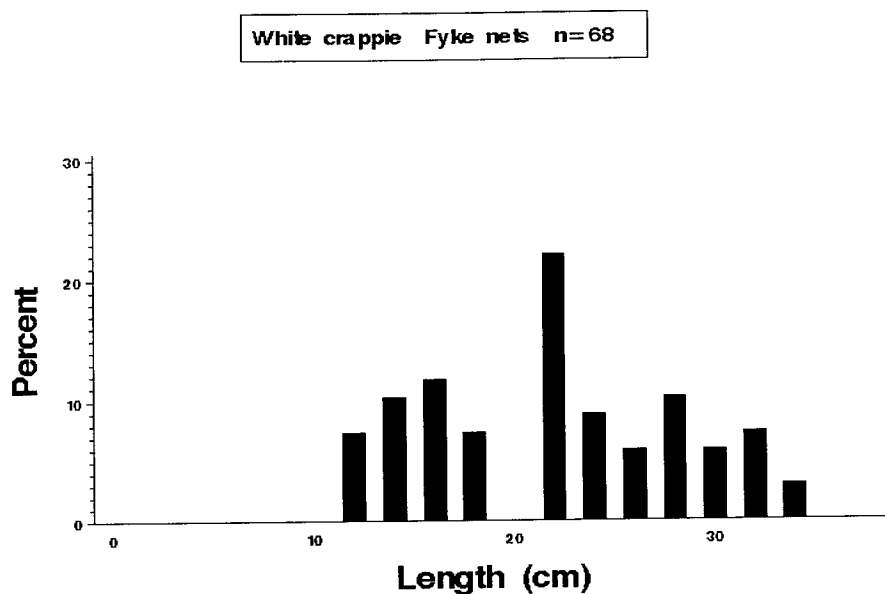
**Figure 2.11.** Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by electrofishing in Upper Mississippi River Pool 8 during 1993.



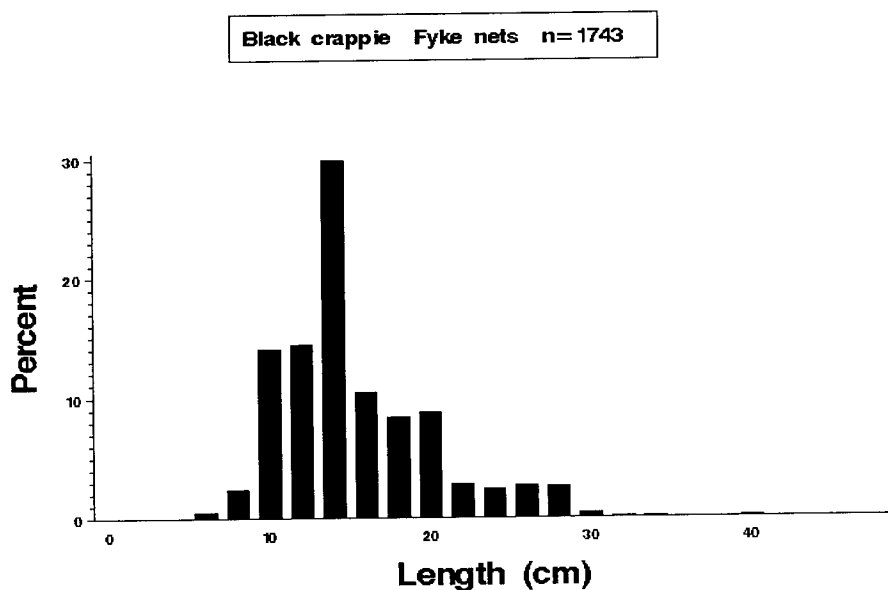
**Figure 2.12.** Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by fyke netting in Upper Mississippi River Pool 8 during 1993.



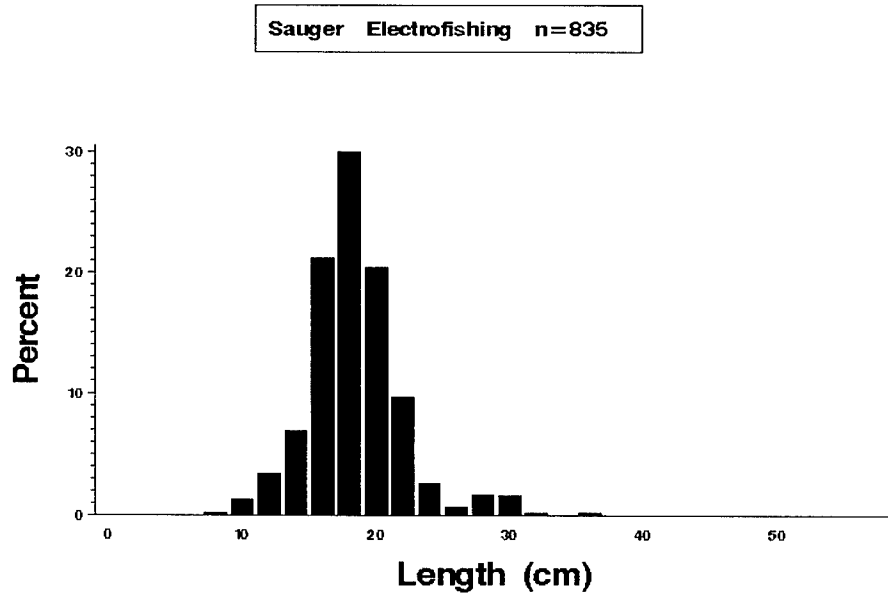
**Figure 2.13.** Length distributions (*length*) as a percentage of catch (*percent*) for largemouth bass (*Micropterus salmoides*) collected by electrofishing in Upper Mississippi River Pool 8 during 1993.



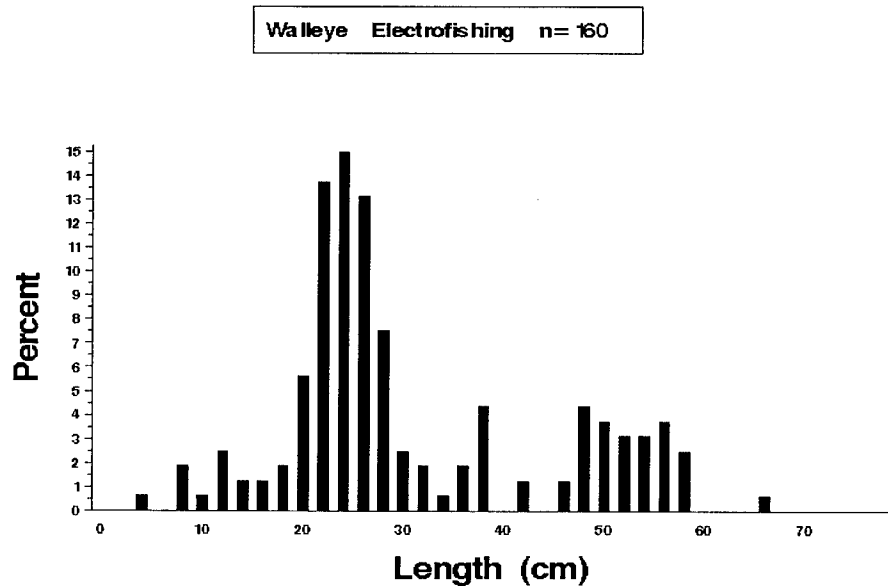
**Figure 2.14.** Length distributions (*length*) as a percentage of catch (*percent*) for white crappie (*Pomoxis annularis*) collected by electrofishing in Upper Mississippi River Pool 8 during 1993.



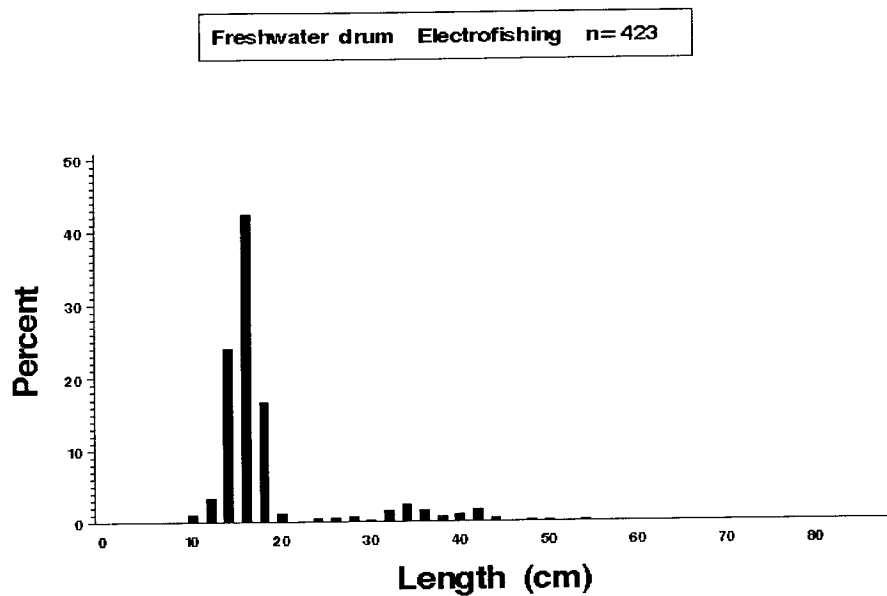
**Figure 2.15.** Length distributions (*length*) as a percentage of catch (*percent*) for black crappie (*Pomoxis nigromaculatus*) collected by electrofishing in Upper Mississippi River Pool 8 during 1993.



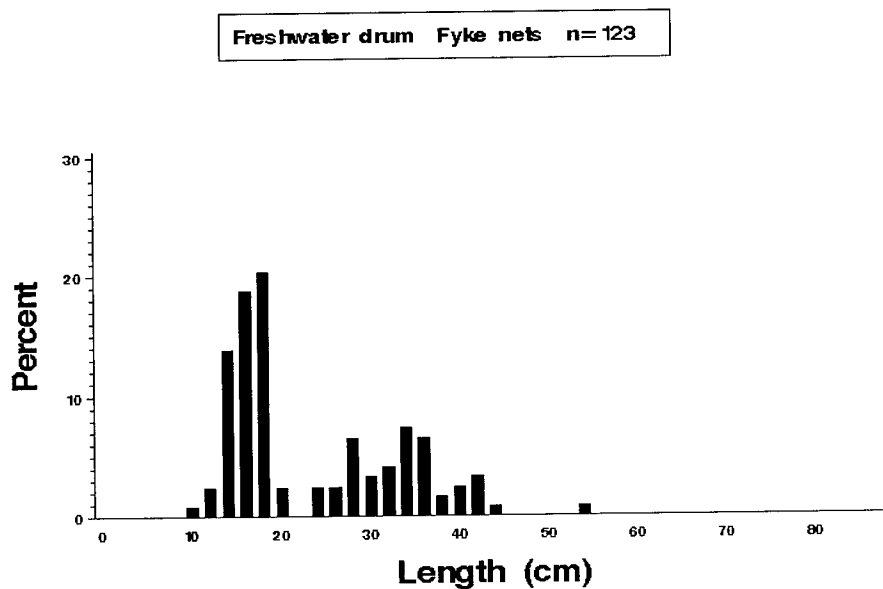
**Figure 2.16.** Length distributions (*length*) as a percentage of catch (*percent*) for sauger (*Stizostedion canadense*) collected by electrofishing in Upper Mississippi River Pool 8 during 1993.



**Figure 2.17.** Length distributions (*length*) as a percentage of catch (*percent*) for walleye (*Stizostedion vitreum*) collected by electrofishing in Upper Mississippi River Pool 8 during 1993.



**Figure 2.18.** Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by electrofishing in Upper Mississippi River Pool 8 during 1993.



**Figure 2.19.** Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by fyke netting in Upper Mississippi River Pool 8 during 1993.

## **Chapter 3. Pool 13, Upper Mississippi River**

by

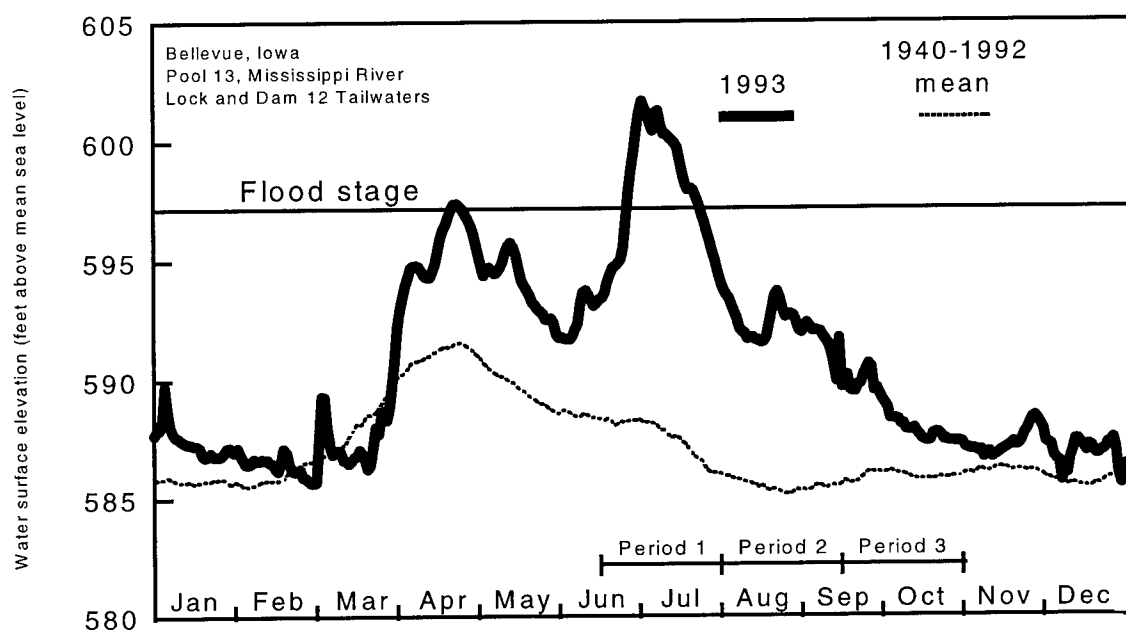
Melvin C. Bowler

Iowa Department of Natural Resources  
Mississippi River Monitoring Station  
206 Rose Street  
Bellevue, Iowa 52031



## Hydrograph

Water levels throughout the sampling periods were considerably higher than the 52-year mean at the Lock and Dam 12 tailwater gage (Figure 3.1). We encountered high water levels throughout the first period (June 15–July 28), and the lowest water levels in the last 2 weeks of the third period (October 18–29). Water levels affected sampling effort in all three periods in 1993, but was especially disruptive to sampling effort in period 1.



**Figure 3.1.** Daily water surface elevation from Lock and Dam 12 for Pool 13, Upper Mississippi River, during 1993 and mean elevation since 1940. The U.S. Army Corps of Engineers discharge data were obtained from the Environmental Management Technical Center (Wlosinski et al. 1995).

## Summary of Sampling Effort

We sampled the fish population in Pool 13 in 1993 using 10 types of gear that were deployed in eight stratum types. A total of 486 samples were allocated during the three periods and 360 samples were completed. Sampling effort was not uniform among all three periods. We completed only 79 samples in the first period, 134 samples in the second, and 147 samples in the third (Table 3.1). High water persisted throughout period 1 and much of period 2. Because many shoreline gears could not be deployed, we omitted all MCBW and TWZ sampling sites during these periods. Of the 360 samples collected, 353 were at stratified random sites and 7 were at fixed sites.

## **Total Catch by Gear**

We collected 19,410 fish representing 65 species and two hybrids. The top five species collected with all gears combined were bluegill (4,163), emerald shiner (3,112), river shiner (2,313), bullhead minnow (1,785), and black crappie (1,487).

We collected 2,230 fish (48 species) by day electrofishing, 1,564 fish (48 species) by night electrofishing, 2,436 fish (31 species, excluding a green sunfish × bluegill) by fyke netting, 1,951 fish (28 species) by tandem fyke netting, 1,901 fish (44 species, excluding a green sunfish × pumpkinseed) by mini fyke netting, 587 fish (26 species) by tandem mini fyke netting, 8,408 fish (44 species) by seining, 72 fish (16 species) by small hoop netting, 231 fish (22 species) by large hoop netting, and 30 fish (4 species) by trawling (Table 3.2).

We collected six western sand darters in 1993, which are listed as a threatened species in Iowa, and we also collected 19 pugnose minnows—this species is listed as being of special concern in Iowa. Other notable species we collected were 3 Mississippi silvery minnows, 1 suckermouth minnow, 2 southern redbelly dace, 5 bluntnose minnows, 3 fathead minnows, 1 creek chub, 7 quillback, 4 white suckers, 1 blue sucker, 2 northern hogsuckers, 1 black buffalo, 2 silver redhorse, 6 stonecat, and 5 smallmouth bass. These species are listed as uncommon, rare, or tributary strays in Pool 13 by Pitlo et al. (1995) and are infrequently encountered in LTRMP sampling.

## **Random Sampling, Mean *C/f* by Gear and Stratum**

Mean catch-per-unit-effort (*C/f*) of dominant fish species for random sampling by gear type and stratum is listed in Tables 3.3.1 to 3.3.9.

### ***Day Electrofishing***

Day electrofishing *C/f* (fish/15 min) was highest for common carp (10.41) in the BWCS stratum, emerald shiner (8.36) in the IMPS stratum, emerald shiner (13.08) in the MCBU stratum, common carp (11.00) in the SCB stratum, and common carp (10.44) for all strata combined (Table 3.3.1).

### ***Night Electrofishing***

Night electrofishing *C/f* (fish/15 min) was highest for bluegill (60.00) in the BWCS stratum, common carp (11.75) in the MCBU stratum, common carp (35.67) in the SCB stratum, and bluegill (21.92) for all strata combined (Table 3.3.2).

### ***Fyke Net***

Fyke netting *C/f* (fish per net-day) was highest for bluegill (26.51) in the BWCS stratum, bluegill (19.17) in the IMPS stratum, and bluegill (25.81) for all strata combined (Table 3.3.3).

### *Tandem Fyke Net*

Tandem fyke netting *C/f* (fish per net-day) was highest for bluegill (32.50) in the BWCO stratum, gizzard shad (1.64) in the IMPO stratum, and bluegill (11.96) for all strata combined (Table 3.3.4).

### *Mini Fyke Net*

Mini fyke netting *C/f* (fish per net-day) was highest for bluegill (36.87) in the BWCS stratum, emerald shiner (7.76) in the IMPS stratum, channel shiner (6.03) in the MCBU stratum, river darter (8.48) in the SCB stratum, and bluegill (13.33) for all strata combined (Table 3.3.5).

### *Tandem Mini Fyke Net*

Tandem mini fyke netting *C/f* (fish per net-day) was highest for bluegill (15.15) in the BWCO stratum, channel catfish (4.64) in the IMPO stratum, and bluegill (5.68) for all strata combined (Table 3.3.6).

### *Small Hoop Net*

Small hoop netting *C/f* (fish per net-day) was highest for bluegill (0.69) in the BWCO stratum, channel catfish (0.17) in the IMPO stratum, channel catfish and bluegill (0.17) in the MCBU stratum, channel catfish (0.18) in the MCBW stratum, channel catfish (0.33) in the SCB stratum, and channel catfish and bluegill (0.21) for all strata combined (Table 3.3.7).

### *Large Hoop Net*

Large hoop netting *C/f* (fish per net-day) was highest for black crappie (2.82) in the BWCO stratum, freshwater drum (0.34) in the IMPO stratum, channel catfish (0.23) in the MCBU stratum, channel catfish (0.25) in the SCB stratum, and black crappie (0.74) for all strata combined (Table 3.3.8).

### *Seine*

Seining *C/f* (fish per haul) was highest for emerald shiner (58.83) in the BWCS stratum, river shiner (40.73) in the IMPS stratum, river shiner (14.88) in the MCBU stratum, emerald shiner (7.20) in the SCB stratum, and emerald shiner (28.06) for all strata combined (Table 3.3.9).

## **Fixed Sampling, Mean *C/f* by Gear and Stratum**

All fixed-site sampling was confined in the TWZ stratum using night electrofishing and trawls. Mean catch-per-unit-effort (*C/f*) of dominant fish species for fixed-site sampling by gear type and stratum is listed in Tables 3.4.1 to 3.4.2.

### *Day Electrofishing*

Night electrofishing *C/f* (fish/15 min) was highest for sauger (32.67; Table 3.4.1).

### *Trawling*

Trawling *C/f* (fish per haul) was highest for channel catfish (4.50; Table 3.4.2).

## **Length Distributions of Selected Species**

Length distributions (expressed as a percentage of total catch by species by gears) for gizzard shad, common carp, smallmouth buffalo, channel catfish, northern pike, white bass, bluegill, largemouth bass, white crappie, black crappie, sauger, walleye, and freshwater drum are illustrated in Figures 3.2 to 3.15. Because data within a single sampling season are taken over a long time and size ranges for certain fish can overlap (e.g., a 6-cm-long bluegill collected early in period 1 is not of the same cohort as a 6-cm-long bluegill collected late in period 3), interpretations in the length distributions should be made cautiously. Length distributions from small samples ( $n < 100$ ) may be included but are not statistically meaningful (Anderson and Neumann 1996).

### *Gizzard Shad*

We collected 183 gizzard shad from day and night electrofishing, with lengths ranging from 6.5 to 34.3 cm (Figure 3.2). Mean length was 12.4 cm, and modal distribution occurred at 12 cm. Few fish longer than 16 cm were collected.

### *Common Carp*

We collected 672 common carp from day and night electrofishing, with lengths ranging from 19.2 to 83.2 cm (Figure 3.3). Mean length was 51.2 cm, and modal distribution occurred at 48 cm, with the majority of fish grouped around 46–54 cm. Young-of-the-year fish (<1.8 cm) were not collected by this gear.

### *Smallmouth Buffalo*

We collected 8 smallmouth buffalo from small and large hoop netting, with lengths ranging from 28.0 to 49.3 cm (Figure 3.4).

### *Channel Catfish*

We collected 31 channel catfish from small and large hoop netting, with lengths ranging from 4.6 to 57.0 cm (Figure 3.5). Mean length was 32.8 cm. About 35% were longer than 38.1 cm (>15 inches).

### *Northern Pike*

We collected 17 northern pike from fyke netting, with lengths ranging from 51.0 to 87.5 cm (Figure 3.6). Mean length was 67.7 cm.

### *White Bass*

We collected 96 white bass from day and night electrofishing, with lengths ranging from 5.5 to 37.5 cm (Figure 3.7). Mean length was 19.1 cm, and modal distribution occurred at 20 cm. Fish less than 14.0 cm are probably age 0 and contributed to 24% of the total catch. About 13% were longer than 22.9 cm (>9 inches).

### *Bluegill*

We collected 553 bluegill from day and night electrofishing, with lengths ranging from 1.5 to 21.0 cm (Figure 3.8). Mean length was 10.8 cm, and modal distribution occurred at 6 cm. About 53% were less than 10 cm (<4 inches) and about 24% were longer than 15.2 cm (>6 inches). We also collected 1,732 bluegill from fyke netting, with lengths ranging from 2.8 to 23.5 cm (Figure 3.9). Mean length was 12.9 cm, and modal distribution occurred at 8 cm. About 31% were longer than 15.2 cm (>6 inches).

### *Largemouth Bass*

We collected 271 largemouth bass from day and night electrofishing, with lengths ranging from 4.6 to 48.3 cm (Figure 3.10). Mean length was 23.9 cm, and modal distribution occurred at 10 and 34 cm. Fish less than 12.0 cm are probably age 0 and contributed to 15% of the total catch. About 12% were longer than 35.5 cm (>14 inches).

### *White Crappie*

We collected 261 white crappie from fyke netting, with lengths ranging from 7.5 to 33.2 cm (Figure 3.11). Mean length was 20.8 cm, and modal distribution occurred at 22 cm. About 64% were longer than 20.3 cm (>8 inches).

### *Black Crappie*

We collected 1,249 black crappie from fyke netting, with lengths ranging from 4.5 to 31.5 cm (Figure 3.12). Mean length was 18.9 cm, and modal distribution occurred at 20 cm. About 49% were longer than 20.3 cm (>8 inches).

### *Sauger*

We collected 177 sauger from day and night electrofishing, with lengths ranging from 12.6 to 45.0 cm (Figure 3.13). Mean length was 24.3 cm, and modal distribution occurred at 24 cm. About 8% were longer than 30.5 cm (>12 inches).

### *Walleye*

We collected 129 walleye from day and night electrofishing, with lengths ranging from 8.6 to 52.9 cm (Figure 3.14). Mean length was 20.7 cm, and modal distribution occurred at 12 cm. About 5% were longer than 38.1 cm (>15 inches).

### *Freshwater Drum*

We collected 258 freshwater drum from day and night electrofishing, with lengths ranging from 4.0 to 55.2 cm (Figure 3.15). Mean length was 18.0 cm, and modal distribution occurred at 10 cm. Fish less than 18 cm are probably age 0 fish and contributed to 57% of the total catch. About 12% were longer than 30.5 cm (>12 inches).

Table 3.1. Allocation of fish sampling effort among strata by the Long Term Resource Monitoring Program in Pool 13 of the Mississippi River during 1993. Table entries are numbers of successfully completed standardized monitoring collections.

Table page: 1

Sampling period = 1: June 15 - July 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	TRI	TWZ	TOTAL
Day electrofishing	6		3	3		3				15
Fyke net	7					4				11
Large hoop net		5	2	2			2			11
Small hoop net		5	2	2			2			11
Mini fyke net	7		2	3		4				16
Seine						6				6
Tandem fyke net		2					2			4
Tandem mini fyke net		3					2			5
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SUBTOTAL	20	15	9	10	0	17	8	0	0	79

Sampling period = 2: August 1 - September 14

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	TRI	TWZ	TOTAL
Day electrofishing	8		2	5		4				19
Fyke net	11					3				14
Large hoop net		6	2	3			2			13
Small hoop net		6	2	3			2			13
Mini fyke net	10		1	4		4				19
Night electrofishing	2		1	2					1	6
Seine	12		4	12		8				36
Tandem fyke net		5					2			7
Tandem mini fyke net		5					2			7
	----	----	----	----	----	----	----	----	----	----
SUBTOTAL	43	22	12	29	0	19	8	0	1	134

Sampling period = 3: September 15 - October 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	TRI	TWZ	TOTAL
Day electrofishing	8		2	4		4				18
Fyke net	10					4				14
Large hoop net		4	2	4	3		2			15
Small hoop net		5	2	4	3		2			16
Mini fyke net	9		3	4		4				20
Night electrofishing	2		2	2					2	8
Seine	12		6	12		8				38
Trawling									4	4
Tandem fyke net		5					2			7
Tandem mini fyke net		5					2			7
	----	----	----	----	----	----	----	----	----	----
SUBTOTAL	41	19	17	30	6	20	8	0	6	147
	====	====	====	====	====	====	====	====	====	====
	104	56	38	69	6	56	24	0	7	360

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 3.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1993 in Pool 13 of the Mississippi River. See Table 3.1 for the list of sampling gears actually deployed in this study reach.

Table page: 1

Species	Common name	Scientific name	D	N	F	X	M	Y	S	HS	HL	G	T	TOTAL
1	Silver lamprey	Ichthyomyzon unicuspis	1	-	-	-	-	-	-	-	-	-	-	1
2	Shovelnose sturgeon	Scaphirhynchus platyrhynchus	-	-	-	-	-	-	-	-	-	-	8	8
3	Longnose gar	Lepisosteus osseus	11	12	9	-	-	-	-	-	-	-	-	32
4	Shortnose gar	Lepisosteus platostomus	6	4	121	14	12	-	1	-	-	-	-	158
5	Bowfin	Amia calva	8	6	35	4	5	-	-	-	-	-	-	59
6	Mooneye	Hiodon tergisus	12	21	1	2	1	-	12	1	3	-	-	53
7	Gizzard shad	Dorosoma cepedianum	150	33	11	20	10	10	57	-	-	-	-	291
8	Spotfin shiner	Cyprinella spiloptera	29	7	-	-	2	-	279	-	-	-	-	317
9	Common carp	Cyprinus carpio	489	183	70	5	17	13	13	-	1	-	-	791
10	Mississippi silvery minnow	Hybognathus nuchalis	-	-	-	-	-	-	3	-	-	-	-	3
11	Speckled chub	Macrhybopsis aestivalis	-	-	-	-	1	-	3	-	-	-	-	4
12	Silver chub	Macrhybopsis storeriana	57	74	-	1	6	-	176	3	-	-	3	320
13	Golden shiner	Notemigonus crysoleucas	22	10	17	54	2	2	1	1	9	-	-	118
14	Emerald shiner	Notropis atherinoides	309	30	-	-	133	12	2628	-	-	-	-	3112
15	River shiner	Notropis biennioides	31	13	-	-	59	6	2204	-	-	-	-	2313
16	Spottail shiner	Notropis blennioides	13	3	-	-	4	-	10	-	-	-	-	30
17	Channel shiner	Notropis hudsonius	3	16	-	-	77	4	213	-	-	-	-	313
18	Pugnose minnow	Opsopoeodus emiliae	-	-	-	-	5	-	14	-	-	-	-	19
19	Suckermouth minnow	Phenacobius mirabilis	-	-	-	-	-	-	1	-	-	-	-	1
20	Southern redbelly dace	Phoxinus erythrogaster	-	-	-	-	-	-	2	-	-	-	-	2
21	Bluntnose minnow	Pimephales notatus	-	-	-	-	-	-	5	-	-	-	-	5
22	Fathead minnow	Pimephales promelas	-	1	-	-	1	-	1	-	-	-	-	3
23	Bullhead minnow	Pimephales vigilax	27	6	-	-	29	2	1721	-	-	-	-	1785
24	Creek chub	Semotilus atromaculatus	-	-	-	-	-	-	1	-	-	-	-	1
25	River carpsucker	Cariodes carpio	8	16	16	9	3	-	1	-	-	-	-	53
26	Quillback	Cariodes cyprinus	-	6	-	-	-	-	-	-	1	-	-	7
27	Highfin carpsucker	Cariodes velifer	7	17	-	-	-	-	-	-	-	-	-	24
28	White sucker	Catostomus commersoni	2	-	2	-	-	-	-	-	-	-	-	4
29	Blue sucker	Cycleptus elongatus	1	-	-	-	-	-	-	-	-	-	-	1
30	Northern hog sucker	Hypentelium nigricans	2	-	-	-	-	-	-	-	-	-	-	2
31	Smallmouth buffalo	Ictiobus bubalus	23	13	5	24	5	1	70	1	7	-	-	149
32	Bigmouth buffalo	Ictiobus cyprinellus	20	1	-	-	1	-	-	-	-	-	-	22
33	Black buffalo	Ictiobus niger	-	1	-	-	-	-	-	-	-	-	-	1
34	Spotted sucker	Minytrema melanops	26	10	36	18	-	1	1	-	3	-	-	95
35	Silver redhorse	Moxostoma anisurum	1	-	1	-	-	-	-	-	-	-	-	2
36	Golden redhorse	Moxostoma erythrum	-	1	-	-	1	-	1	-	-	-	-	3
37	Shorthead redhorse	Moxostoma macrolepidotum	54	100	16	17	1	2	13	3	9	-	1	216
38	Black bullhead	Ameiurus melas	1	-	9	2	9	-	-	-	1	-	-	22
39	Yellow bullhead	Ameiurus natalis	1	-	40	5	8	-	-	2	5	-	-	61

Gears: D - Day electrofishing  
N - Night electrofishing  
F - Fyke netting  
X - Tandem fyke netting  
M - Mini fyke netting  
Y - Tandem mini fyke netting

S - Seining  
HS - Small hoop netting  
HL - Large hoop netting  
G - Gill netting  
T - Trawling (4.8-m bottom trawl)



Table 3.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1993 in Pool 13 of the Mississippi River. See Table 3.1 for the list of sampling gears actually deployed in this study reach.

Table page: 2

Species	Common name	Scientific name	D	N	F	X	M	Y	S	HS	HL	G	T	TOTAL
40	Channel catfish	Ictalurus punctatus	20	10	13	2	33	57	23	18	13	-	18	207
41	Stonecat	Noturus flavus	-	-	-	-	6	-	-	-	-	-	-	6
42	Tadpole madtom	Noturus gyrinus	-	1	-	-	29	3	8	-	-	-	-	41
43	Flathead catfish	Pylodictis olivaris	6	4	2	1	2	-	-	7	6	-	-	28
44	Northern pike	Esox lucius	2	1	15	2	3	1	3	-	1	-	-	28
45	Brook silverside	Labidesthes sicculus	16	19	-	-	28	-	89	-	-	-	-	152
46	White bass	Morone chrysops	33	63	42	43	1	-	97	-	1	-	-	280
47	Yellow bass	Morone mississippiensis	-	2	-	-	-	-	-	-	-	-	-	2
48	Rock bass	Ambloplites rupestris	3	2	-	-	1	-	-	-	-	-	-	6
49	Pumpkinseed	Lepomis gibbosus	20	15	104	92	19	1	2	1	4	-	-	258
50	Warmouth	Lepomis gulosus	8	4	6	3	2	-	-	-	1	-	-	24
51	Orangespotted sunfish	Lepomis humilis	73	6	5	4	26	4	22	2	-	-	-	142
52	Bluegill	Lepomis macrochirus	284	269	960	772	1057	392	382	25	22	-	-	4163
53	Green sunfish x pumpkinseed	L. cyanellus x L. gibbosus	-	-	-	-	1	-	-	-	-	-	-	1
54	Green sunfish x bluegill	L. cyanellus x L. macrochirus	-	-	1	-	-	-	-	-	-	-	-	1
55	Smallmouth bass	Micropterus dolomieu	1	3	1	-	-	-	-	-	-	-	-	5
56	Largemouth bass	Micropterus salmoides	200	71	27	3	19	1	29	-	1	-	-	351
57	White crappie	Pomoxis annularis	38	3	90	171	74	2	3	-	43	-	-	424
58	Black crappie	Pomoxis nigromaculatus	30	44	707	542	31	21	25	2	85	-	-	1487
59	Western sand darter	Ammocrypta clara	-	-	-	-	-	-	6	-	-	-	-	6
60	Mud darter	Etheostoma asprigene	5	2	-	-	6	5	16	-	-	-	-	34
61	Johnny darter	Etheostoma nigrum	-	2	-	-	29	-	109	-	-	-	-	140
62	Yellow perch	Perca flavescens	7	38	19	102	-	1	-	1	-	-	-	168
63	Logperch	Percina caprodes	22	3	-	-	5	1	45	-	-	-	-	76
64	River darter	Percina shumardi	1	1	-	-	100	7	60	1	-	-	-	170
65	Sauger	Stizostedion canadense	35	142	4	6	-	1	1	1	2	-	-	192
66	Walleye	Stizostedion vitreum	34	95	2	3	4	1	10	-	-	-	-	149
67	Freshwater drum	Aplodinotus grunniens	78	180	49	30	33	36	47	3	12	-	-	468
			=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
			2230	1564	2436	1951	1901	587	8408	72	231	0	30	19410

Gears: D - Day electrofishing  
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F - Fyke netting  
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M - Mini fyke netting  
Y - Tandem mini fyke netting  
S - Seining  
HS - Small hoop netting  
HL - Large hoop netting  
G - Gill netting  
T - Trawling (4.8-m bottom trawl)

Table 3.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by day electrofishing in Pool 13 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 3.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Silver lamprey	0.03 (0.03)					0.08 (0.08)				
Longnose gar	0.35 (0.17)					0.83 (0.44)		0.14 (0.14)		
Shortnose gar	0.11 (0.05)		0.23 (0.11)					0.14 (0.14)		
Bowfin	0.13 (0.05)		0.27 (0.12)		0.09 (0.09)			0.14 (0.14)		
Mooneye	0.38 (0.20)					0.83 (0.52)		0.29 (0.18)		
Gizzard shad	2.66 (1.09)		5.32 (3.02)		0.73 (0.36)	0.92 (0.53)		2.00 (1.38)		
Spotfin shiner	0.45 (0.21)		0.41 (0.28)		1.09 (0.58)	0.25 (0.13)		0.71 (0.71)		
Common carp	10.44 (1.88)		10.41 (1.75)		5.09 (1.38)	10.58 (3.19)		11.00 (5.22)		
Silver chub	0.56 (0.24)		0.64 (0.54)		3.27 (2.79)	0.33 (0.26)		0.43 (0.30)		
Golden shiner	0.19 (0.08)		0.32 (0.20)		1.27 (0.71)			0.14 (0.14)		
Emerald shiner	6.46 (1.80)		1.95 (1.00)		8.36 (6.89)	13.08 (4.63)		2.43 (1.09)		
River shiner	0.26 (0.11)		0.14 (0.10)		2.18 (0.93)	0.17 (0.17)		0.29 (0.29)		
Spottail shiner	0.04 (0.04)				1.18 (1.09)					
Channel shiner	0.10 (0.08)					0.08 (0.08)		0.29 (0.29)		
Bullhead minnow	0.50 (0.30)		0.23 (0.13)		1.00 (0.60)	0.17 (0.17)		1.29 (1.13)		
River carpsucker	0.15 (0.08)		0.23 (0.11)		0.09 (0.09)			0.29 (0.29)		
Highfin carpsucker	0.22 (0.11)					0.50 (0.29)		0.14 (0.14)		
White sucker	0.03 (0.03)		0.09 (0.09)							
Blue sucker	0.03 (0.03)					0.08 (0.08)				
Northern hog sucker	0.07 (0.05)					0.08 (0.08)		0.14 (0.14)		
Smallmouth buffalo	0.37 (0.11)		0.68 (0.25)		0.36 (0.20)	0.25 (0.18)		0.14 (0.14)		
Bigmouth buffalo	0.56 (0.35)		0.23 (0.15)			1.00 (0.91)		0.43 (0.30)		
Spotted sucker	0.40 (0.18)		1.18 (0.55)							
Silver redhorse	0.03 (0.03)					0.08 (0.08)				
Shorthead redhorse	1.13 (0.45)		0.27 (0.12)		1.55 (1.00)	2.25 (1.19)		0.57 (0.20)		
Black bullhead					0.09 (0.09)					
Yellow bullhead	0.02 (0.02)		0.05 (0.05)							
Channel catfish	0.34 (0.15)		0.18 (0.08)		0.73 (0.36)	0.67 (0.40)				
Flathead catfish	0.15 (0.08)		0.05 (0.05)		0.09 (0.09)	0.25 (0.18)		0.14 (0.14)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 3.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by day electrofishing in Pool 13 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 3.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Northern pike	0.04 (0.04)				0.09 (0.09)			0.14 (0.14)		
Brook silverside	0.14 (0.06)		0.09 (0.06)		1.09 (0.73)			0.29 (0.18)		
White bass	0.64 (0.24)		0.18 (0.14)		1.18 (0.55)	0.75 (0.43)		1.00 (0.69)		
Rock bass	0.05 (0.04)		0.05 (0.05)		0.09 (0.09)			0.14 (0.14)		
Pumpkinseed	0.28 (0.09)		0.45 (0.21)		0.64 (0.31)	0.08 (0.08)		0.29 (0.18)		
Warmouth	0.14 (0.07)		0.32 (0.20)			0.08 (0.08)				
Orangespotted sunfish	1.03 (0.31)		2.55 (0.88)		1.18 (0.81)	0.25 (0.18)		0.14 (0.14)		
Bluegill	4.40 (0.94)		8.73 (2.30)		4.91 (3.63)	1.42 (0.77)		3.00 (1.70)		
Smallmouth bass					0.09 (0.09)					
Largemouth bass	3.20 (0.53)		5.14 (1.13)		4.36 (1.81)	1.58 (0.56)		2.86 (1.18)		
White crappie	0.61 (0.21)		1.64 (0.61)			0.17 (0.11)				
Black crappie	0.54 (0.17)		0.82 (0.24)		0.45 (0.21)	0.08 (0.08)		0.86 (0.59)		
Mud darter	0.09 (0.05)		0.05 (0.05)		0.18 (0.12)	0.08 (0.08)		0.14 (0.14)		
Yellow perch	0.11 (0.08)		0.09 (0.06)		0.27 (0.19)			0.29 (0.29)		
Logperch	0.15 (0.06)		0.05 (0.05)		1.73 (1.16)			0.29 (0.18)		
River darter					0.09 (0.09)					
Sauger	0.66 (0.23)		0.86 (0.34)		0.45 (0.21)	0.75 (0.51)		0.29 (0.18)		
Walleye	0.45 (0.14)		0.59 (0.19)		1.36 (0.97)	0.25 (0.13)		0.43 (0.43)		
Freshwater drum	1.50 (0.50)		0.86 (0.35)		2.36 (0.95)	1.25 (0.73)		2.57 (1.57)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 3.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by night electrofishing in Pool 13 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 3.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar	1.05 (0.66)					2.25 (1.65)		0.67 (0.67)		
Bowfin	0.53 (0.34)		1.25 (0.95)			0.25 (0.25)				
Mooneye	1.64 (0.83)		0.75 (0.48)			1.75 (1.03)		2.67 (2.67)		
Gizzard shad	1.33 (0.26)		2.50 (0.50)			0.50 (0.29)		1.00 (0.58)		
Spotfin shiner	0.45 (0.22)		0.50 (0.29)			0.25 (0.25)		0.67 (0.67)		
Common carp	15.56 (9.04)		4.50 (0.87)			11.75 (3.97)		35.67 (33.67)		
Silver chub	5.06 (3.58)		3.00 (1.58)			1.25 (0.75)		13.33 (13.33)		
Golden shiner	0.88 (0.79)		2.25 (2.25)			0.25 (0.25)				
Emerald shiner	2.07 (0.92)		2.75 (2.10)			1.50 (0.50)		2.00 (2.00)		
River shiner	0.18 (0.18)							0.67 (0.67)		
Spottail shiner	0.27 (0.20)		0.50 (0.50)			0.25 (0.25)				
Channel shiner	0.18 (0.18)							0.67 (0.67)		
Fathead minnow	0.09 (0.09)							0.33 (0.33)		
Bullhead minnow	0.44 (0.26)		1.00 (0.71)			0.25 (0.25)				
River carpsucker	1.23 (1.15)		0.25 (0.25)					4.33 (4.33)		
Quillback	0.57 (0.38)					1.25 (0.95)		0.33 (0.33)		
Highfin carpsucker	0.90 (0.51)		0.75 (0.48)			0.50 (0.50)		1.67 (1.67)		
Smallmouth buffalo	0.62 (0.40)		0.50 (0.50)			0.25 (0.25)		1.33 (1.33)		
Bigmouth buffalo	0.09 (0.09)							0.33 (0.33)		
Black buffalo	0.10 (0.10)					0.25 (0.25)				
Spotted sucker	0.26 (0.13)		0.50 (0.29)					0.33 (0.33)		
Golden redbreast	0.09 (0.09)							0.33 (0.33)		
Shorthead redbreast	7.86 (2.12)		3.00 (3.00)			10.75 (3.09)		10.00 (5.29)		
Channel catfish	0.84 (0.39)		0.25 (0.25)			1.50 (0.87)		0.67 (0.67)		
Tadpole madtom	0.09 (0.09)		0.25 (0.25)							
Flathead catfish	0.19 (0.13)					0.25 (0.25)		0.33 (0.33)		
Northern pike	0.09 (0.09)							0.33 (0.33)		
Brook silverside	1.48 (1.36)		4.25 (3.92)							
White bass	0.89 (0.39)		1.25 (0.75)			0.50 (0.29)		1.00 (1.00)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 3.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by night electrofishing in Pool 13 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 3.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Pumpkinseed	1.22 (1.22)		3.50 (3.50)							
Warmouth	0.35 (0.28)		0.25 (0.25)					1.00 (1.00)		
Orangespotted sunfish	0.56 (0.25)		0.50 (0.29)			1.00 (0.58)				
Bluegill	21.92 (19.60)		60.00 (56.37)			2.50 (1.89)		0.33 (0.33)		
Smallmouth bass	0.09 (0.09)							0.33 (0.33)		
Largemouth bass	5.47 (3.47)		13.50 (9.87)			2.00 (1.41)				
Black crappie	3.14 (2.93)		8.75 (8.42)			0.25 (0.25)				
Mud darter	0.17 (0.17)		0.50 (0.50)							
Johnny darter	0.19 (0.13)					0.25 (0.25)		0.33 (0.33)		
Yellow perch	3.30 (3.30)		9.50 (9.50)							
Logperch	0.26 (0.26)		0.75 (0.75)							
Sauger	3.95 (1.02)		3.50 (1.19)			2.50 (0.87)		6.67 (3.28)		
Walleye	3.17 (0.71)		4.00 (1.22)			3.00 (1.08)		2.33 (1.45)		
Freshwater drum	10.81 (3.27)		17.75 (7.85)			9.00 (4.64)		4.33 (0.33)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 3.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by fyke netting in Pool 13 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 3.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar	0.28 (0.27)		0.30 (0.30)		0.10 (0.10)					
Shortnose gar	1.60 (0.49)		0.78 (0.30)		9.38 (4.32)					
Bowfin	0.90 (0.31)		0.89 (0.33)		1.05 (0.75)					
Mooneye	0.03 (0.03)		0.04 (0.04)							
Gizzard shad	0.26 (0.11)		0.25 (0.12)		0.36 (0.36)					
Common carp	1.25 (0.48)		0.95 (0.46)		4.14 (2.62)					
Golden shiner	0.48 (0.19)		0.51 (0.21)		0.28 (0.21)					
River carpsucker	0.43 (0.16)		0.44 (0.18)		0.37 (0.28)					
White sucker	0.04 (0.03)		0.04 (0.04)		0.10 (0.10)					
Smallmouth buffalo	0.14 (0.09)		0.15 (0.10)		0.09 (0.09)					
Spotted sucker	1.09 (0.47)		1.18 (0.52)		0.19 (0.19)					
Silver redhorse	0.03 (0.03)		0.04 (0.04)							
Shorthead redhorse	0.43 (0.23)		0.44 (0.25)		0.37 (0.16)					
Black bullhead	0.29 (0.13)		0.32 (0.15)							
Yellow bullhead	0.92 (0.64)		0.89 (0.70)		1.20 (0.82)					
Channel catfish	0.24 (0.11)		0.18 (0.12)		0.75 (0.39)					
Flathead catfish	0.04 (0.03)		0.04 (0.04)		0.10 (0.10)					
Northern pike	0.45 (0.20)		0.49 (0.22)		0.10 (0.10)					
White bass	0.98 (0.22)		0.93 (0.23)		1.48 (0.71)					
Pumpkinseed	2.77 (1.04)		2.86 (1.15)		1.98 (0.99)					
Warmouth	0.17 (0.08)		0.18 (0.09)		0.09 (0.09)					
Orangespotted sunfish	0.16 (0.06)		0.17 (0.07)							
Bluegill	25.81 (8.23)		26.51 (9.03)		19.17 (12.41)					
Green sunfish x bluegill	0.03 (0.03)		0.04 (0.04)							
Smallmouth bass	0.01 (0.01)				0.10 (0.10)					
Largemouth bass	0.47 (0.14)		0.34 (0.13)		1.63 (0.81)					
White crappie	2.92 (1.05)		3.23 (1.17)							
Black crappie	22.12 (6.62)		24.14 (7.34)		3.05 (1.46)					
Yellow perch	0.61 (0.30)		0.68 (0.33)							

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 3.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by fyke netting in Pool 13 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 3.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCEW	SCB	TRI	TWZ
Sauger	0.08 (0.05)		0.07 (0.05)		0.18 (0.12)					
Walleye	0.02 (0.01)				0.19 (0.13)					
Freshwater drum	1.29 (0.74)		1.31 (0.82)		1.08 (0.79)					

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 3.3.4. Mean catch-per-unit-effort and (standard error) for fishes collected by tandem fyke netting in Pool 13 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 3.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shortnose gar	0.22 (0.09)	0.59 (0.25)								
Bowfin	0.06 (0.04)	0.17 (0.10)								
Mooneye	0.07 (0.06)	0.04 (0.04)		0.09 (0.09)						
Gizzard shad	1.05 (0.85)	0.04 (0.04)		1.64 (1.35)						
Common carp	0.07 (0.05)	0.20 (0.13)								
Silver chub	0.06 (0.06)			0.09 (0.09)						
Golden shiner	0.83 (0.31)	2.26 (0.83)								
River carpsucker	0.17 (0.09)	0.33 (0.20)		0.09 (0.09)						
Smallmouth buffalo	0.36 (0.33)	0.98 (0.89)								
Spotted sucker	0.31 (0.11)	0.70 (0.27)		0.09 (0.09)						
Shorthead redhorse	0.37 (0.14)	0.57 (0.22)		0.26 (0.18)						
Black bullhead	0.03 (0.03)	0.08 (0.08)								
Yellow bullhead	0.08 (0.05)	0.21 (0.13)								
Channel catfish	0.03 (0.03)	0.09 (0.09)								
Flathead catfish	0.05 (0.05)			0.08 (0.08)						
Northern pike	0.07 (0.06)	0.05 (0.05)		0.08 (0.08)						
White bass	0.97 (0.42)	1.44 (0.75)		0.69 (0.50)						
Pumpkinseed	1.42 (0.56)	3.87 (1.53)								
Warmouth	0.05 (0.03)	0.13 (0.09)								
Orangespotted sunfish	0.06 (0.05)	0.17 (0.13)								
Bluegill	11.96 (3.03)	32.50 (8.25)								
Largemouth bass	0.05 (0.03)	0.13 (0.09)								
White crappie	2.65 (0.90)	7.19 (2.43)								
Black crappie	8.46 (2.83)	22.70 (7.71)		0.17 (0.11)						
Yellow perch	1.56 (0.68)	4.25 (1.85)								
Sauger	0.21 (0.12)	0.12 (0.09)		0.26 (0.18)						
Walleye	0.09 (0.06)	0.08 (0.06)		0.09 (0.09)						
Freshwater drum	1.08 (0.46)	0.59 (0.18)		1.37 (0.72)						

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



Table 3.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by mini fyke netting in Pool 13 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 3.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shortnose gar	0.22 (0.10)		0.04 (0.04)		0.49 (0.23)	0.29 (0.22)		0.32 (0.20)		
Bowfin	0.01 (0.01)				0.40 (0.25)					
Mooneye	0.03 (0.03)					0.09 (0.09)				
Gizzard shad	0.16 (0.13)		0.04 (0.04)		0.44 (0.35)	0.34 (0.34)				
Spotfin shiner	0.03 (0.03)				0.08 (0.08)	0.09 (0.09)				
Common carp	0.37 (0.15)		0.42 (0.31)			0.27 (0.19)		0.51 (0.35)		
Speckled chub	0.04 (0.04)							0.17 (0.17)		
Silver chub	0.18 (0.13)		0.04 (0.04)		0.08 (0.08)	0.09 (0.09)		0.51 (0.51)		
Golden shiner	0.02 (0.01)		0.04 (0.04)		0.09 (0.09)					
Emerald shiner	1.24 (0.50)		0.96 (0.43)		7.76 (5.04)	1.73 (1.19)				
River shiner	1.08 (0.76)				2.21 (1.12)	2.67 (2.03)				
Spottail shiner	0.05 (0.05)		0.15 (0.15)							
Channel shiner	2.44 (1.76)				0.33 (0.18)	6.03 (4.71)		0.69 (0.51)		
Pugnose minnow	0.08 (0.06)		0.11 (0.11)		0.08 (0.08)			0.16 (0.16)		
Fathead minnow					0.08 (0.08)					
Bullhead minnow	0.75 (0.36)		0.32 (0.17)		0.17 (0.11)	1.23 (0.87)		0.69 (0.52)		
River carpsucker	0.04 (0.04)		0.11 (0.11)							
Smallmouth buffalo	0.01 (0.01)				0.39 (0.27)					
Bigmouth buffalo	0.01 (0.01)		0.04 (0.04)							
Golden redhorse					0.09 (0.09)					
Shorthead redhorse	0.01 (0.01)		0.04 (0.04)							
Black bullhead	0.12 (0.05)		0.12 (0.06)		0.35 (0.27)	0.19 (0.13)				
Yellow bullhead	0.13 (0.09)		0.12 (0.06)		0.24 (0.17)			0.33 (0.33)		
Channel catfish	0.37 (0.16)		0.50 (0.36)		1.30 (1.12)	0.19 (0.19)		0.35 (0.22)		
Stonecat	0.05 (0.04)		0.12 (0.12)		0.26 (0.26)					
Tadpole madtom	0.30 (0.12)		0.34 (0.13)		1.27 (0.63)	0.38 (0.29)				
Flathead catfish	0.06 (0.06)					0.17 (0.17)				
Northern pike	0.01 (0.01)				0.23 (0.17)					
Brook silverside	0.31 (0.27)		0.87 (0.80)		0.62 (0.36)					

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 3.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by mini fyke netting in Pool 13 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 3.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
White bass					0.09 (0.09)					
Rock bass					0.09 (0.09)					
Pumpkinseed	0.27 (0.22)		0.68 (0.65)					0.17 (0.17)		
Warmouth	0.03 (0.03)		0.08 (0.08)							
Orangespotted sunfish	1.04 (0.85)		0.03 (0.03)			0.46 (0.21)		3.33 (3.33)		
Bluegill	13.33 (11.57)		36.87 (34.57)		0.95 (0.65)	1.25 (0.78)		1.83 (1.83)		
Green x pumpkinseed sunfish					0.08 (0.08)					
Largemouth bass	0.25 (0.10)		0.27 (0.12)		0.71 (0.46)			0.51 (0.34)		
White crappie	0.94 (0.77)		2.80 (2.32)							
Black crappie	0.23 (0.09)		0.28 (0.17)		1.89 (1.64)	0.18 (0.12)				
Mud darter	0.06 (0.03)		0.15 (0.09)		0.16 (0.11)					
Johnny darter	0.49 (0.18)		0.60 (0.34)		0.52 (0.52)	0.73 (0.37)				
Logperch	0.12 (0.07)		0.04 (0.04)		0.09 (0.09)	0.27 (0.19)				
River darter	3.50 (2.05)		0.69 (0.33)			2.97 (1.62)		8.48 (7.68)		
Walleye	0.08 (0.05)				0.16 (0.16)	0.19 (0.13)				
Freshwater drum	0.60 (0.24)		0.48 (0.23)		0.69 (0.52)	0.98 (0.60)		0.18 (0.18)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 3.3.6. Mean catch-per-unit-effort and (standard error) for fishes collected by tandem mini fyke netting in Pool 13 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 3.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Gizzard shad	0.14 (0.09)	0.39 (0.24)								
Common carp	0.22 (0.15)	0.46 (0.39)		0.08 (0.08)						
Golden shiner	0.03 (0.02)	0.08 (0.05)								
Emerald shiner	0.21 (0.14)	0.43 (0.34)		0.09 (0.09)						
River shiner	0.09 (0.06)	0.24 (0.17)								
Channel shiner	0.06 (0.06)	0.15 (0.15)								
Bullhead minnow	0.03 (0.03)	0.08 (0.08)								
Smallmouth buffalo	0.01 (0.01)	0.04 (0.04)								
Spotted sucker	0.01 (0.01)	0.04 (0.04)								
Shorthead redhorse	0.07 (0.06)	0.04 (0.04)		0.09 (0.09)						
Channel catfish	2.97 (1.97)	0.11 (0.11)		4.64 (3.12)						
Tadpole madtom	0.04 (0.02)	0.12 (0.06)								
Northern pike	0.01 (0.01)	0.04 (0.04)								
Pumpkinseed	0.01 (0.01)	0.04 (0.04)								
Orangespotted sunfish	0.06 (0.03)	0.15 (0.09)								
Bluegill	5.68 (2.92)	15.15 (7.94)		0.17 (0.17)						
Largemouth bass	0.06 (0.06)			0.09 (0.09)						
White crappie	0.03 (0.03)	0.08 (0.08)								
Black crappie	0.31 (0.25)	0.83 (0.67)								
Mud darter	0.07 (0.04)	0.20 (0.11)								
Yellow perch	0.01 (0.01)	0.04 (0.04)								
Logperch	0.01 (0.01)	0.04 (0.04)								
River darter	0.18 (0.08)	0.20 (0.13)		0.17 (0.11)						
Sauger	0.02 (0.02)	0.04 (0.04)								
Walleye	0.05 (0.05)			0.08 (0.08)						
Freshwater drum	1.02 (0.47)	0.88 (0.75)		1.11 (0.60)						

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 3.3.7. Mean catch-per-unit-effort and (standard error) for fishes collected by small hoop netting in Pool 13 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 3.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Mooneye	0.01 (0.01)							0.08 (0.08)		
Silver chub	0.02 (0.02)	0.09 (0.09)								
Golden shiner	0.01 (0.01)	0.03 (0.03)								
Smallmouth buffalo	0.01 (0.01)							0.08 (0.08)		
Shorthead redhorse	0.01 (0.01)						0.35 (0.17)	0.08 (0.08)		
Yellow bullhead	0.02 (0.02)	0.06 (0.06)								
Channel catfish	0.21 (0.07)	0.25 (0.15)		0.17 (0.11)		0.17 (0.08)	0.18 (0.18)	0.33 (0.16)		
Flathead catfish	0.07 (0.03)	0.06 (0.06)				0.06 (0.06)		0.33 (0.17)		
Pumpkinseed	0.01 (0.01)	0.03 (0.03)								
Orangespotted sunfish	0.02 (0.01)	0.06 (0.04)								
Bluegill	0.21 (0.08)	0.69 (0.31)				0.17 (0.17)				
Black crappie	0.02 (0.02)	0.06 (0.06)								
Yellow perch	0.01 (0.01)	0.03 (0.03)								
River darter	0.04 (0.04)			0.08 (0.08)						
Sauger	0.04 (0.04)			0.09 (0.09)						
Freshwater drum	0.05 (0.04)	0.03 (0.03)		0.08 (0.08)				0.08 (0.08)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 3.3.8. Mean catch-per-unit-effort and (standard error) for fishes collected by large hoop netting in Pool 13 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 3.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Bowfin	0.01 (0.01)	0.03 (0.03)								
Mooneye	0.08 (0.05)	0.03 (0.03)		0.17 (0.11)						
Common carp	0.01 (0.01)	0.03 (0.03)								
Golden shiner	0.08 (0.05)	0.30 (0.18)								
Quillback	0.01 (0.01)	0.03 (0.03)								
Smallmouth buffalo	0.07 (0.04)	0.07 (0.05)				0.22 (0.17)		0.08 (0.08)		
Spotted sucker	0.03 (0.03)	0.10 (0.10)								
Shorthead redhorse	0.20 (0.12)			0.35 (0.26)		0.11 (0.07)		0.25 (0.25)		
Black bullhead	0.01 (0.01)	0.03 (0.03)								
Yellow bullhead	0.04 (0.04)	0.17 (0.17)								
Channel catfish	0.15 (0.05)	0.17 (0.08)		0.08 (0.08)		0.23 (0.15)		0.25 (0.17)		
Flathead catfish	0.06 (0.02)	0.07 (0.05)				0.11 (0.07)		0.17 (0.11)		
Northern pike	0.01 (0.01)	0.03 (0.03)								
White bass	0.01 (0.01)	0.03 (0.03)								
Pumpkinseed	0.04 (0.02)	0.10 (0.07)				0.06 (0.06)				
Warmouth	0.01 (0.01)	0.03 (0.03)								
Bluegill	0.18 (0.07)	0.74 (0.28)								
Largemouth bass	0.01 (0.01)	0.03 (0.03)								
White crappie	0.36 (0.24)	1.44 (0.96)								
Black crappie	0.74 (0.48)	2.82 (1.91)		0.08 (0.08)						
Sauger	0.02 (0.01)	0.06 (0.04)								
Freshwater drum	0.22 (0.10)	0.17 (0.11)		0.34 (0.21)		0.05 (0.05)		0.17 (0.11)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 3.3.9. Mean catch-per-unit-effort and (standard error) for fishes collected by seining in Pool 13 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 3.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shortnose gar					0.05 (0.05)					
Mooneye	0.16 (0.09)		0.08 (0.08)		0.14 (0.10)	0.21 (0.17)		0.20 (0.20)		
Gizzard shad	0.84 (0.40)		1.13 (0.69)		0.05 (0.05)	1.17 (0.87)		0.10 (0.10)		
Spotfin shiner	1.23 (0.42)		1.46 (0.77)		10.00 (8.19)	0.96 (0.44)		0.10 (0.10)		
Common carp	0.02 (0.01)				0.59 (0.38)					
Mississippi silvery minnow	0.04 (0.04)		0.13 (0.13)							
Speckled chub	0.06 (0.03)					0.08 (0.06)		0.10 (0.10)		
Silver chub	2.74 (0.95)		1.08 (0.70)		0.14 (0.10)	5.79 (2.41)		0.80 (0.70)		
Golden shiner					0.05 (0.05)					
Emerald shiner	28.06 (11.71)		58.83 (34.52)		36.86 (26.03)	13.88 (4.27)		7.20 (2.69)		
River shiner	21.09 (5.61)		36.75 (15.31)		40.73 (27.19)	14.88 (5.15)		6.90 (3.36)		
Spottail shiner	0.03 (0.02)		0.04 (0.04)		0.41 (0.21)					
Channel shiner	2.91 (0.78)		6.08 (2.09)		0.95 (0.45)	1.42 (0.52)		1.20 (1.09)		
Pugnose minnow	0.17 (0.08)		0.46 (0.24)		0.09 (0.06)	0.04 (0.04)				
Suckermouth minnow	0.01 (0.01)		0.04 (0.04)							
Southern redbelly dace	0.02 (0.01)		0.04 (0.04)		0.05 (0.05)					
Bluntnose minnow	0.03 (0.03)		0.08 (0.08)		0.14 (0.14)					
Fathead minnow					0.05 (0.05)					
Bullhead minnow	15.65 (6.38)		36.83 (18.77)		33.36 (22.83)	2.13 (0.69)		5.20 (3.13)		
Creek chub	0.01 (0.01)		0.04 (0.04)							
River carpsucker					0.05 (0.05)					
Smallmouth buffalo	0.13 (0.07)		0.04 (0.04)		3.14 (2.08)					
Spotted sucker					0.05 (0.05)					
Golden redhorse					0.05 (0.05)					
Shorthead redhorse	0.03 (0.02)		0.04 (0.04)		0.55 (0.38)					
Channel catfish	0.32 (0.11)		0.21 (0.10)		0.14 (0.07)	0.58 (0.27)		0.10 (0.10)		
Tadpole madtom	0.10 (0.04)		0.29 (0.13)		0.05 (0.05)					
Northern pike					0.14 (0.10)					
Brook silverside	0.79 (0.34)		1.96 (0.99)		1.68 (0.87)	0.21 (0.13)				

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 3.3.9. Mean catch-per-unit-effort and (standard error) for fishes collected by seining in Pool 13 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 3.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
White bass	0.23 (0.11)		0.04 (0.04)		4.18 (2.72)	0.13 (0.13)		0.10 (0.10)		
Pumpkinseed	0.02 (0.01)		0.04 (0.04)		0.05 (0.05)					
Orangespotted sunfish	0.30 (0.10)		0.63 (0.26)		0.05 (0.05)	0.25 (0.15)				
Bluegill	4.47 (2.27)		12.92 (6.80)		3.23 (1.86)			0.10 (0.10)		
Largemouth bass	0.19 (0.08)		0.33 (0.22)		0.86 (0.34)			0.20 (0.13)		
White crappie	0.04 (0.04)		0.13 (0.13)							
Black crappie	0.21 (0.09)		0.38 (0.23)		0.59 (0.44)	0.04 (0.04)		0.20 (0.13)		
Western sand darter	0.09 (0.06)		0.08 (0.08)			0.17 (0.13)				
Mud darter	0.25 (0.10)		0.38 (0.25)		0.09 (0.06)	0.04 (0.04)		0.40 (0.22)		
Johnny darter	1.57 (0.33)		2.67 (0.78)		0.55 (0.25)	0.79 (0.28)		1.40 (0.70)		
Logperch	0.21 (0.11)		0.38 (0.29)		1.55 (1.08)	0.08 (0.06)				
River darter	0.89 (0.22)		1.33 (0.45)		0.23 (0.15)	0.63 (0.27)		0.80 (0.53)		
Sauger	0.03 (0.03)							0.10 (0.10)		
Walleye	0.05 (0.03)		0.08 (0.06)		0.32 (0.27)	0.04 (0.04)				
Freshwater drum	0.56 (0.14)		0.54 (0.23)		0.55 (0.41)	0.83 (0.30)		0.20 (0.13)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 3.4.1. Mean catch-per-unit-effort and (standard error) for fishes collected by night electrofishing in Pool 13 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar									0.33 (0.33)
Shortnose gar									1.33 (0.33)
Mooneye									1.00 (1.00)
Gizzard shad									6.00 (4.51)
Spotfin shiner									0.67 (0.67)
Common carp									3.67 (0.33)
Silver chub									5.67 (2.60)
Emerald shiner									2.33 (1.45)
River shiner									3.67 (3.67)
Channel shiner									4.67 (4.67)
Bullhead minnow									0.33 (0.33)
River carpsucker									0.67 (0.67)
Highfin carpsucker									2.33 (0.33)
Smallmouth buffalo									2.00 (1.00)
Spotted sucker									2.33 (0.67)
Shorthead redhorse									5.00 (2.52)
Channel catfish									0.33 (0.33)
Flathead catfish									0.67 (0.67)
Brook silverside									0.67 (0.33)
White bass									17.67 (8.95)
Yellow bass									0.67 (0.67)
Rock bass									0.67 (0.67)
Pumpkinseed									0.33 (0.33)
Bluegill									6.00 (3.79)
Smallmouth bass									0.67 (0.33)
Largemouth bass									3.00 (2.52)
White crappie									1.00 (0.58)
Black crappie									2.67 (1.76)
River darter									0.33 (0.33)
Sauger									32.67 (15.30)

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



Table 3.4.1. Mean catch-per-unit-effort and (standard error) for fishes collected by night electrofishing in Pool 13 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 2

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Walleye									20.00 (9.45)
Freshwater drum									20.00 (2.08)

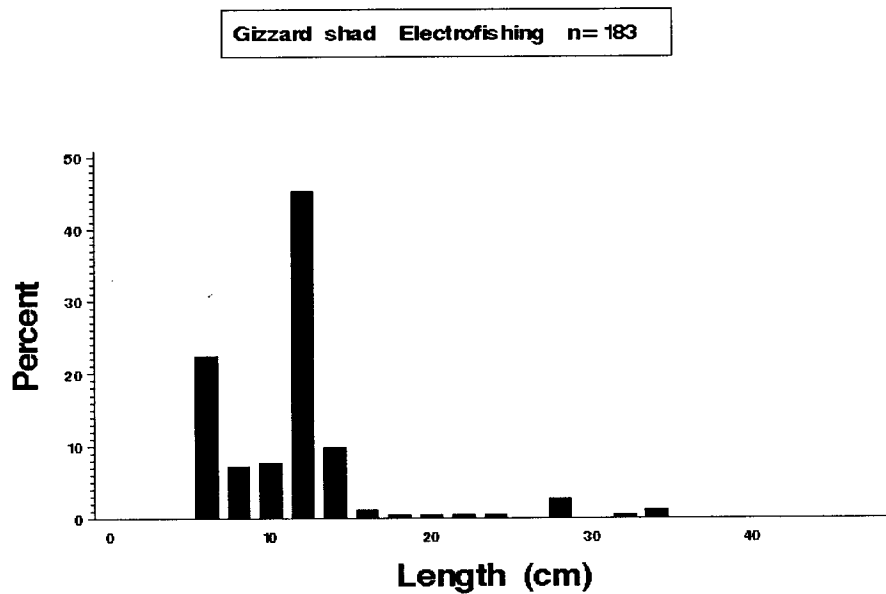
Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 3.4.2. Mean catch-per-unit-effort and (standard error) for fishes collected by bottom trawling in Pool 13 of the Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

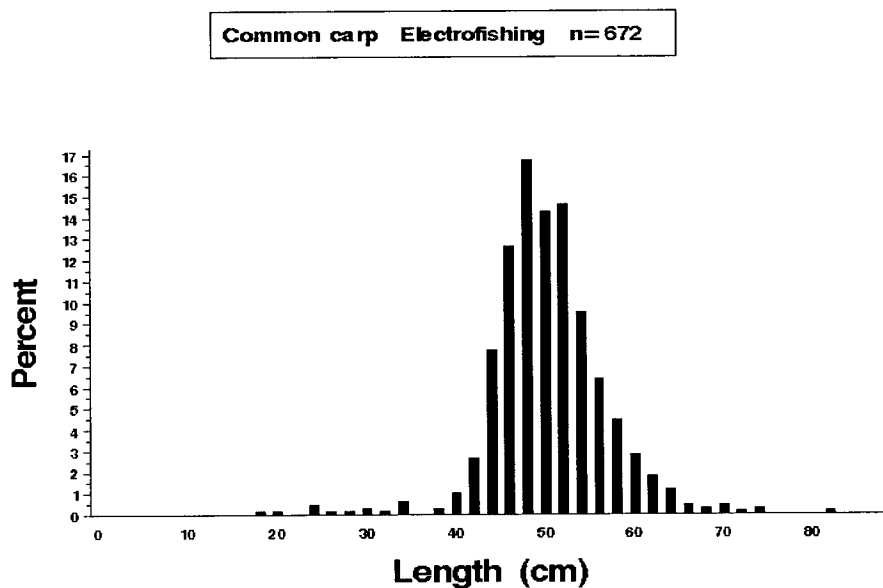
Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shovelnose sturgeon									2.00 (2.00)
Silver chub									0.75 (0.48)
Shorthead redhorse									0.25 (0.25)
Channel catfish									4.50 (3.23)

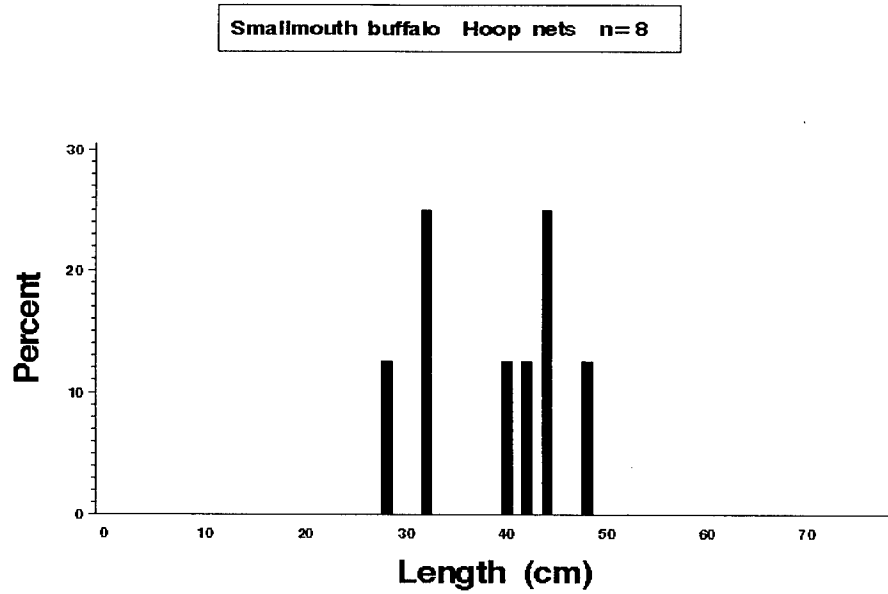
Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



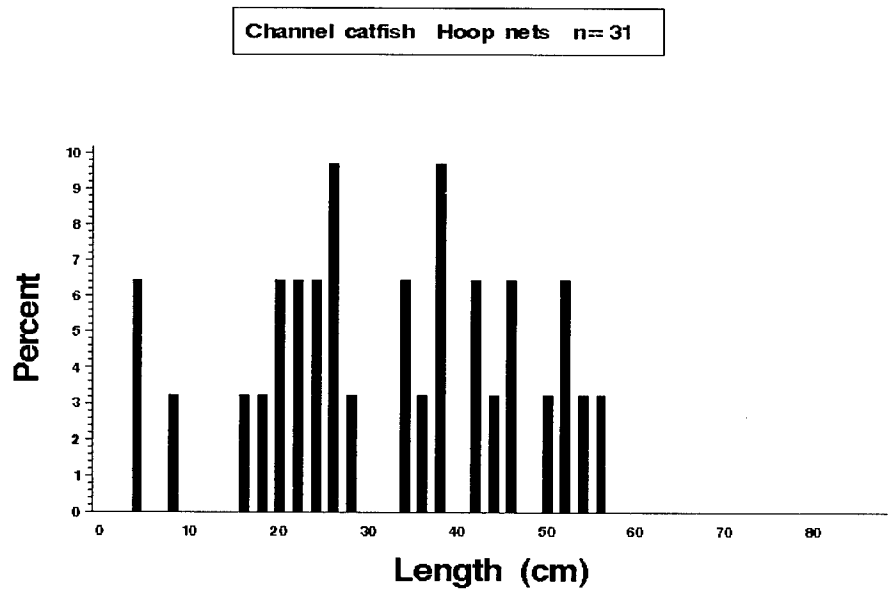
**Figure 3.2.** Length distributions (*length*) as a percentage of catch (*percent*) for gizzard shad (*Dorosoma cepedianum*) collected by electrofishing in Upper Mississippi River Pool 13 during 1993.



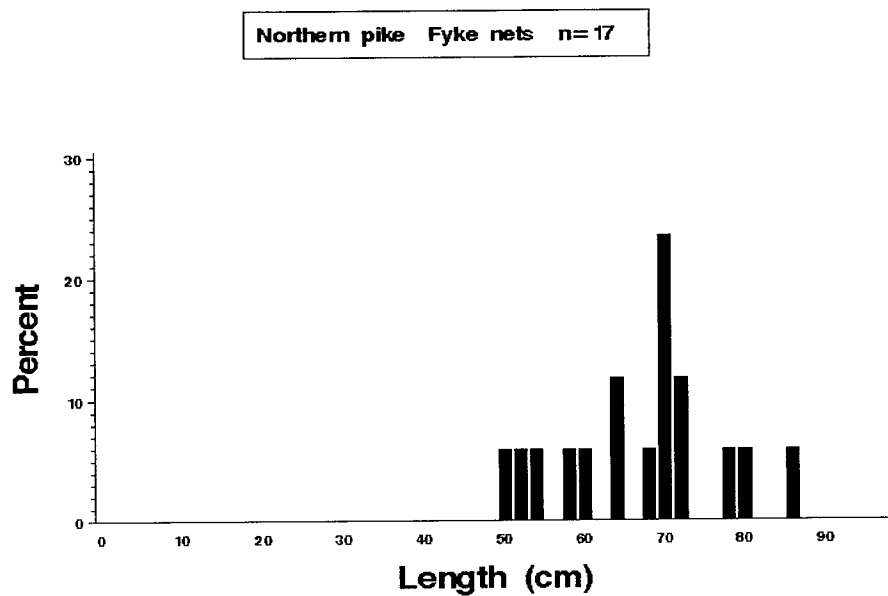
**Figure 3.3.** Length distributions (*length*) as a percentage of catch (*percent*) for common carp (*Cyprinus carpio*) collected by electrofishing in Upper Mississippi River Pool 13 during 1993.



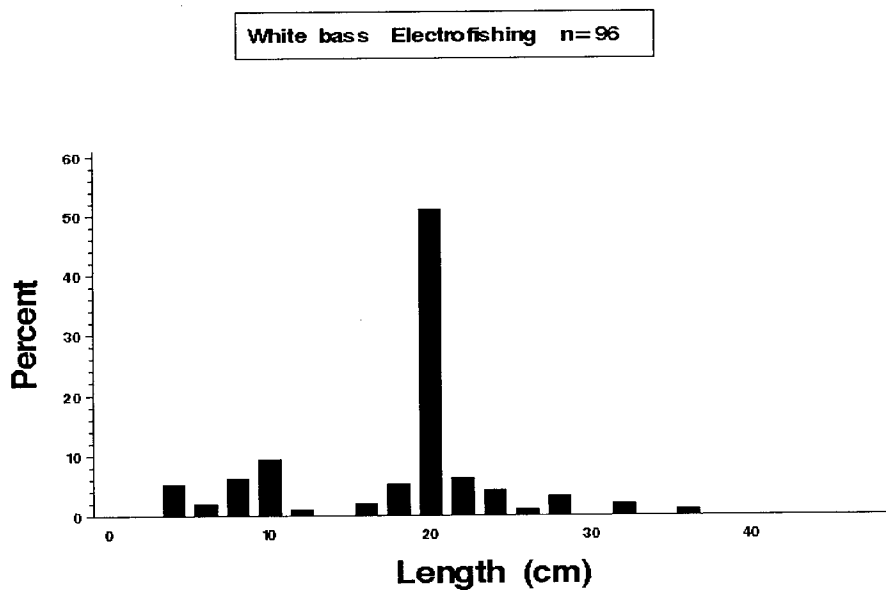
**Figure 3.4.** Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by small and large hoop netting in Upper Mississippi River Pool 13 during 1993.



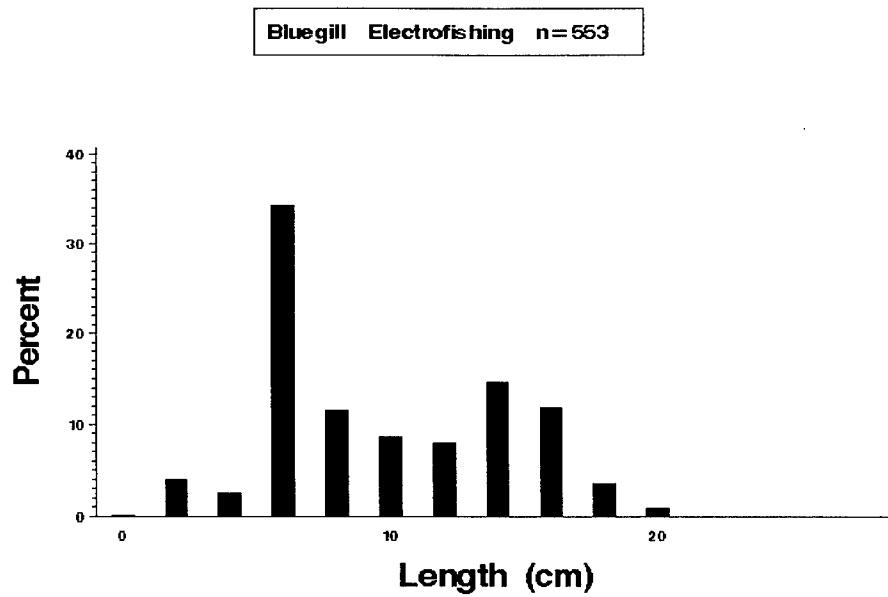
**Figure 3.5.** Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by large and small hoop netting in Upper Mississippi River Pool 13 during 1993.



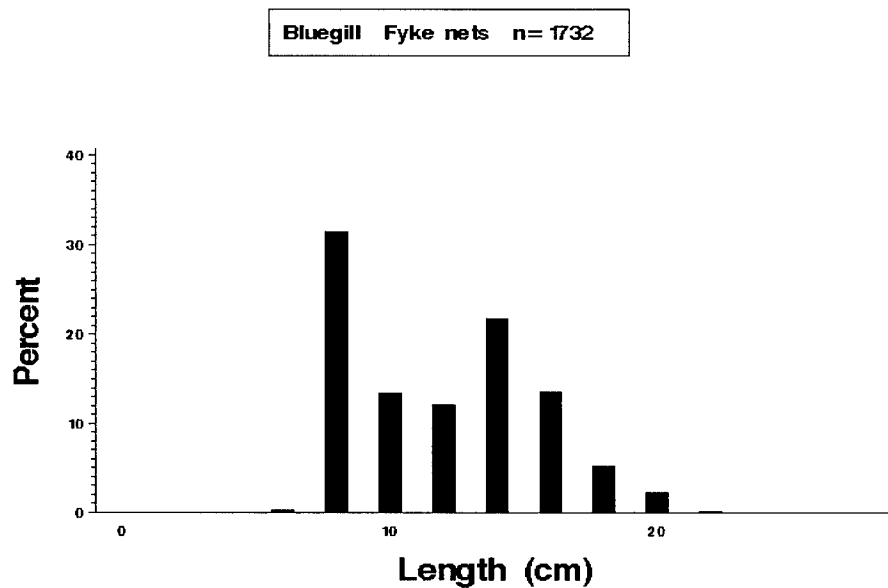
**Figure 3.6.** Length distributions (*length*) as a percentage of catch (*percent*) for northern pike (*Esox lucius*) collected by fyke netting in Upper Mississippi River Pool 13 during 1993.



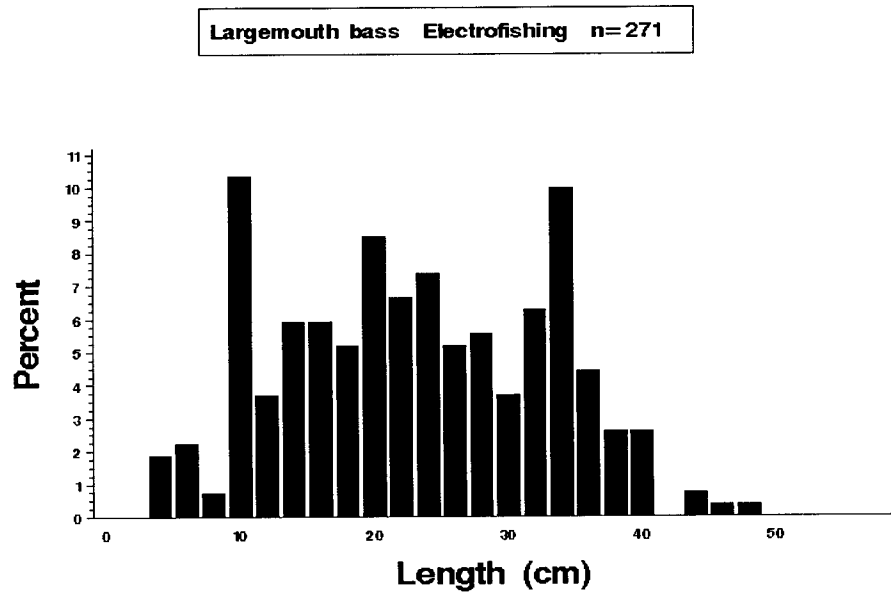
**Figure 3.7.** Length distributions (*length*) as a percentage of catch (*percent*) for white bass (*Morone chrysops*) collected by electrofishing in Upper Mississippi River Pool 13 during 1993.



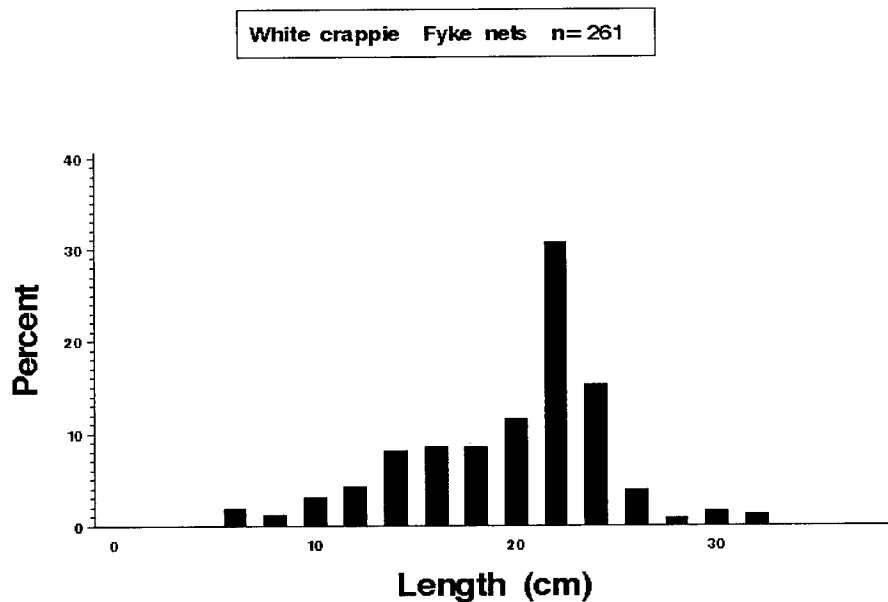
**Figure 3.8.** Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by electrofishing in Upper Mississippi River Pool 13 during 1993.



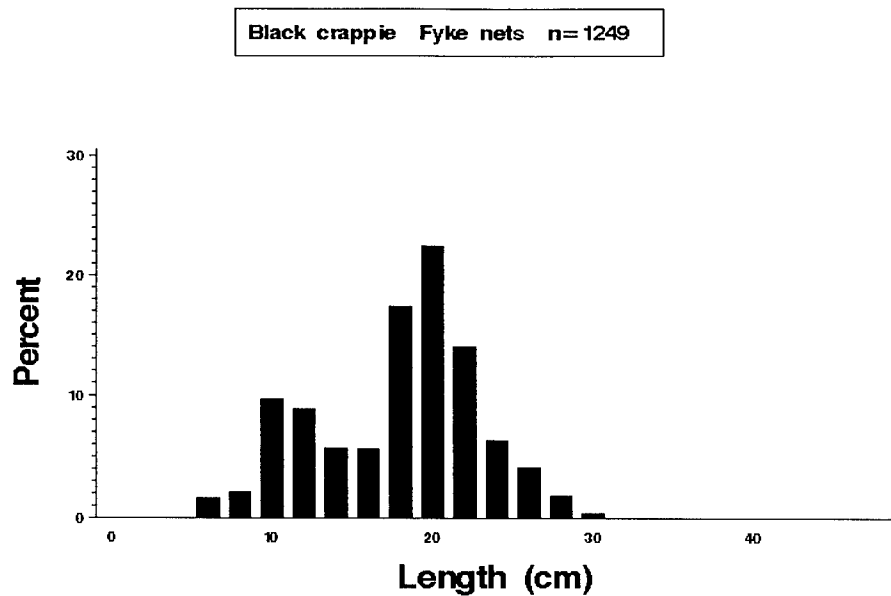
**Figure 3.9.** Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by fyke netting in Upper Mississippi River Pool 13 during 1993.



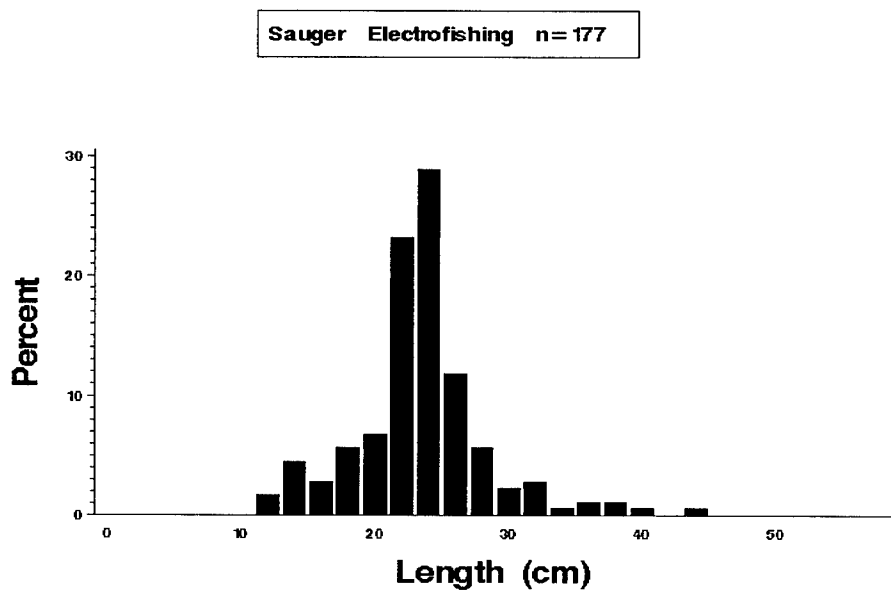
**Figure 3.10.** Length distributions (*length*) as a percentage of catch (*percent*) for largemouth bass (*Micropterus salmoides*) collected by electrofishing in Upper Mississippi River Pool 13 during 1993.



**Figure 3.11.** Length distributions (*length*) as a percentage of catch (*percent*) for white crappie (*Pomoxis annularis*) collected by fyke netting in Upper Mississippi River Pool 13 during 1993.

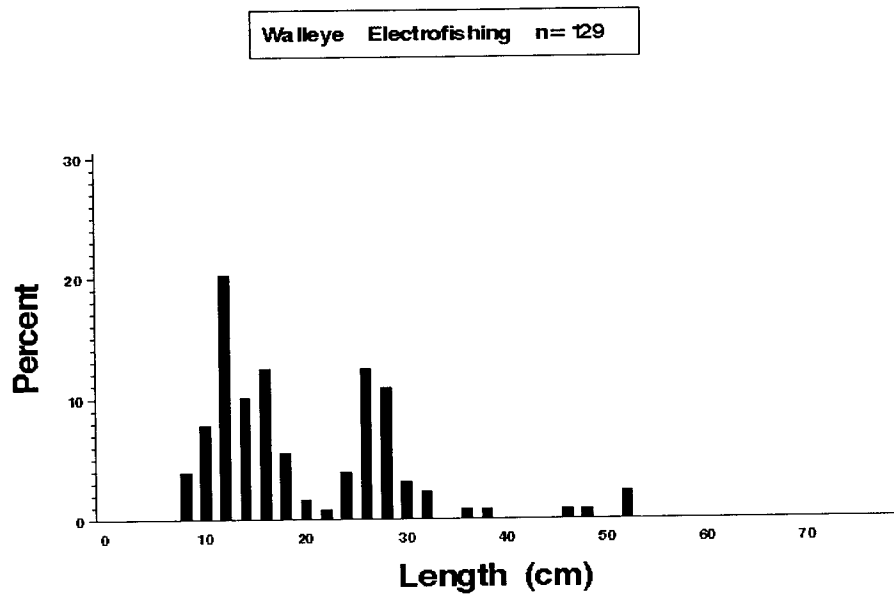


**Figure 3.12.** Length distributions (*length*) as a percentage of catch (*percent*) for black crappie (*Pomoxis nigromaculatus*) collected by fyke netting in Upper Mississippi River Pool 13 during 1993.

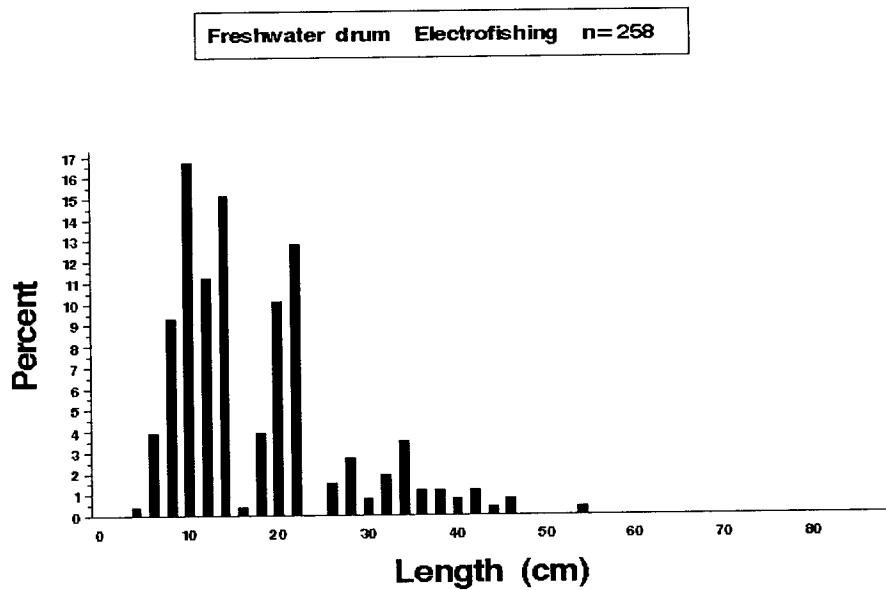


**Figure 3.13.** Length distributions (*length*) as a percentage of catch (*percent*) for sauger (*Stizostedion canadense*) collected by electrofishing in Upper Mississippi River Pool 13 during 1993.





**Figure 3.14.** Length distributions (*length*) as a percentage of catch (*percent*) for walleye (*Stizostedion vitreum*) collected by electrofishing in Upper Mississippi River Pool 13 during 1993.



**Figure 3.15.** Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by electrofishing in Upper Mississippi River Pool 13 during 1993.

## **Chapter 4. Pool 26, Upper Mississippi River**

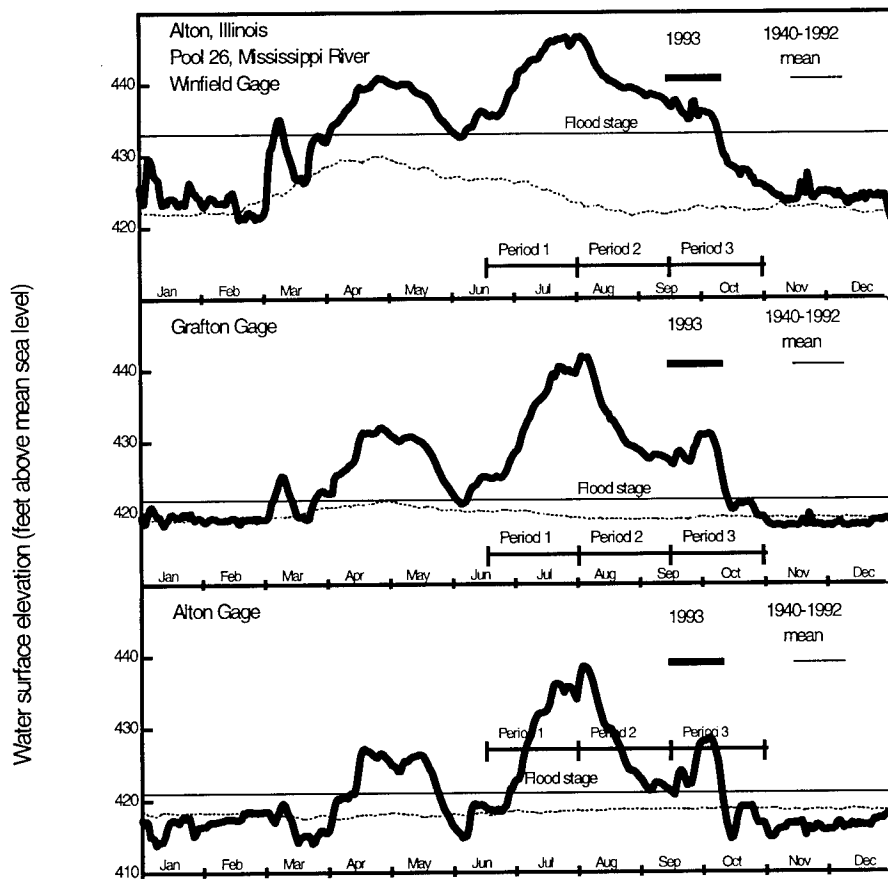
by

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Illinois Natural History Survey  
Alton Field Station  
4134 Alby Street  
Alton, Illinois 62002

## Hydrograph

Water levels at Pool 26 are influenced by discharge from the Mississippi, Illinois, and Missouri Rivers. The pool is regulated at a midpool control point by the U.S. Army Corps of Engineers. These factors combine to give Pool 26 a highly fluctuating hydrologic regime. Three sets of hydrographs are shown to accurately represent these fluctuations (Figure 4.1). Gages are located at Lock and Dam 25 tailwater (Winfield Gage), midpool (Grafton Gage), and Lock and Dam 26 impoundment (Alton Gage). Each graph shows 1940–92 daily means and 1993 daily water levels. All three 1993 hydrographs show extreme flooding in Pool 26. The flood surpassed records for elevation and duration. The highest water levels occurred throughout the summer months (June–October). The flooding dramatically affected standard LTRMP fish sampling in 1993. All standard LTRMP fish sampling was suspended and an ancillary floodplain sampling strategy was adopted for much of the field season. This floodplain sampling (not included in the present report) was conducted from June 28, 1993, through August 25, 1993, and is identified in the LTRMP data set by project code E-010.



**Figure 4.1.** Daily water surface elevation from Winfield, Grafton, and Alton Gages for Pool 26, Upper Mississippi River, during 1993 and mean elevation since 1940. Discharge data were obtained from the U.S. Army Corps of Engineers, St. Louis District.

## Summary of Sampling Effort

We collected 116 samples from random sites using eight gears in 1993 (Table 4.1). There were 37 samples collected in the first period and 79 in the third period. The flooding prevented the collection of any standard LTRMP samples in the second period. The greatest effort (31 samples) was expended in the MCBU stratum. The least effort (8 samples) was expended in the IMPO stratum.

## Total Catch by Gear

We collected 11,613 fish representing 62 species during the 1993 field season (Table 4.2). The five most numerically abundant species were the gizzard shad (5,286), channel catfish (1,265), unidentified buffalo (712), white bass (618), and bluegill (546). Total number of fish and species collected by gear type were day electrofishing, 6,738 fish of 49 species; fyke nets, 794 fish of 25 species; tandem fyke nets, 519 fish of 16 species; mini fyke nets, 2,209 fish of 45 species; tandem mini fyke nets, 589 fish of 16 species; seines, 142 fish of 9 species; small hoop nets, 356 fish of 10 species; and large hoop nets, 266 fish of 18 species. We collected four species in 1993 that had not been previously collected in LTRMP samples. These species were the fathead minnow, grass pickerel, pirate perch, and starhead topminnow.

## Random Sampling, Mean *C/f* by Gear and Stratum

### *Day Electrofishing*

For day electrofishing (Table 4.3.1), gizzard shad had the highest *C/f* in all strata combined (137.41), followed by emerald shiner (35.12) and white bass (22.16). Gizzard shad also had the highest *C/f* in the BWCS (19.72), IMPS (220.50), MCBU (161.09), and SCB (96.00) strata. The second and third highest *C/f* by stratum were BWCS (common carp, 3.80; bluegill, 3.76), IMPS (bigmouth buffalo, 32.75; smallmouth buffalo, 19.00), MCBU (emerald shiner, 21.11; white bass, 16.31), and SCB (emerald shiner, 73.67; common carp, 39.33).

### *Fyke Net*

For fyke netting (Table 4.3.2), bluegill had the highest *C/f* in all strata combined (5.22), followed by white bass (4.69) and black crappie (1.19). In the BWCS stratum, bluegill had the highest *C/f* (43.53), followed by white bass (24.90) and shortnose gar (9.10). Black crappie had the highest *C/f* in the IMPS stratum (14.21), followed by freshwater drum (10.90) and smallmouth buffalo (6.38). White bass had the highest *C/f* in the SCB stratum (2.02), followed by gizzard shad (1.01), channel catfish (0.51), flathead catfish (0.51), and black crappie (0.51).

### *Tandem Fyke Net*

For tandem fyke netting (Table 4.3.3), freshwater drum had the highest *C/f* in both strata combined (29.04), followed by gizzard shad (22.37) and white bass (11.18). In the BWCO stratum, channel catfish had the highest *C/f* (3.79), followed by freshwater drum (3.11) and bluegill (2.42). Freshwater drum had the highest *C/f* in the IMPO stratum (47.18), followed by gizzard shad (37.87) and white bass (18.64).

### *Mini Fyke Net*

For mini fyke netting (Table 4.3.4), channel catfish had the highest *C/f* in all strata combined (76.35), followed by gizzard shad (16.11) and white bass (3.67). The three highest *C/fs* by stratum were BWCS (gizzard shad, 112.15; smallmouth buffalo, 6.54; river shiner, 3.86), IMPS (gizzard shad, 30.34; bigmouth buffalo, 28.19; channel catfish, 20.36), and SCB (channel catfish, 88.71; white bass, 4.08; emerald shiner, 3.09).

### *Tandem Mini Fyke Net*

For tandem mini fyke netting (Table 4.3.5), gizzard shad had the highest *C/f* in both strata combined (31.87), followed by channel catfish (26.23) and bluegill (1.15). Channel catfish had the highest *C/f* in the BWCO stratum (45.50), followed by smallmouth buffalo (2.22) and gizzard shad (1.83). Gizzard shad had the highest *C/f* in the IMPO stratum (52.86), followed by channel catfish (12.76), bluegill (1.82), and freshwater drum (1.82).

### *Small Hoop Net*

For small hoop netting (Table 4.3.6), channel catfish had the highest *C/f* in all strata combined (3.32), followed by common carp (0.21) and white bass (0.20). The highest *C/fs* by stratum were BWCO (channel catfish, 16.96; bluegill, 2.96; smallmouth buffalo, 0.09; river carpsucker, 0.09), IMPO (bluegill, 1.01; freshwater drum, 0.50), MCBU (channel catfish, 3.82; common carp, 0.31; white bass, 0.24), and SCB (channel catfish, 1.60; smallmouth buffalo, 0.12; blue catfish, 0.12; white bass, 0.12).

### *Large Hoop Net*

For large hoop netting (Table 4.3.7), smallmouth buffalo had the highest *C/f* in all strata combined (1.78), followed by channel catfish (0.34) and flathead catfish (0.25). Smallmouth buffalo also had the highest *C/f* for the BWCO stratum (9.62), followed by bluegill (1.88) and river carpsucker (1.70). River carpsucker had the highest *C/f* in the IMPO stratum (1.26), followed by black crappie (1.01), white bass (0.50), and white crappie (0.50). Smallmouth buffalo had the highest *C/f* in the MCBU stratum (2.34), followed by flathead catfish (0.33) and channel catfish (0.17). Channel catfish had the highest *C/f* in the SCB stratum (0.69), followed by smallmouth buffalo (0.10) and flathead catfish (0.10).

### *Seine*

The only stratum sampled by seining was the SCB (Table 4.3.8). Gizzard shad had the highest *C/f* (25.50), followed by channel catfish (5.00) and emerald shiner (2.75).

## Length Distributions of Selected Species

Length distributions are presented for selected species in Figures 4.2 to 4.14. The length distributions for some gears may be limited by the size selectiveness of the particular gear. Length distributions from small samples ( $n < 100$ ) may be included but are not statistically meaningful (Anderson and Neumann 1996).

### *Gizzard Shad*

The electrofishing length distribution from 3,546 gizzard shad (Figure 4.2) is characterized by one large group with a mode of 8 cm and a relatively small group near 24–26 cm.

### *Common Carp*

The electrofishing length distribution from 215 common carp (Figure 4.3) shows three distinct size groups: one between 2 and 8 cm, one between 20 and 30 cm, and one with a mode of 50 cm.

### *Smallmouth Buffalo*

The electrofishing length distribution from 170 smallmouth buffalo (Figure 4.4) is characterized by a large group of small fish (2–6 cm). Most of the remaining fish are between 10 and 30 cm, with a few fish longer than 40 cm. The hoop net length distribution from 162 smallmouth buffalo (Figure 4.5) shows more large fish, mostly between 30 and 50 cm.

### *Channel Catfish*

The electrofishing length distribution from 154 channel catfish (Figure 4.6) shows many young fish between 4 and 10 cm, and the remainder spread between 20 and 60 cm. The hoop net length distribution from 309 channel catfish (Figure 4.7) shows a mode length of 24 cm.

### *White Bass*

The electrofishing length distribution from 206 white bass (Figure 4.8) is characterized by a distinct length group between 10 and 20 cm. A few smaller fish are also present.

### *Bluegill*

The electrofishing length distribution from 165 bluegill (Figure 4.9) shows a fairly even distribution between 2 and 20 cm, with a mode length of 6 cm. The fyke net length distribution from 284 bluegill (Figure 4.10) shows mostly larger fish, with a mode length of 14 cm.

### *Largemouth Bass*

The electrofishing length distribution from 65 largemouth bass (Figure 4.11) shows fish ranging from 0 to 44 cm, with a mode length of 12 cm.

### *Black Crappie*

The fyke netting length distribution from 89 black crappie (Figure 4.12) appears bimodal, with a peak at 10 and 20 cm.

### *Freshwater Drum*

The electrofishing length distribution from 91 freshwater drum (Figure 4.13) is characterized by a group near 10 cm and the remainder between 20 and 60 cm. The fyke netting length distribution from 252 freshwater drum is very similar, with a mode length of 12 cm and a maximum length of 56 cm (Figure 4.14).

Table 4.1. Allocation of fish sampling effort among strata by the Long Term Resource Monitoring Program in Pool 26 of the Mississippi River during 1993. Table entries are numbers of successfully completed standardized monitoring collections.

Table page: 1

Sampling period = 1: June 15 - July 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	TRI	TWZ	TOTAL
Day electrofishing	4			1		4				9
Fyke net	3					2				5
Large hoop net		2	1	3			2			8
Small hoop net		2		3			2			7
Mini fyke net	4					2				6
Tandem fyke net		1								1
Tandem mini fyke net		1								1
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SUBTOTAL	11	6	1	7	0	8	4	0	0	37

Sampling period = 3: September 15 - October 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	TRI	TWZ	TOTAL
Day electrofishing	6		3	11		4				24
Fyke net	3		2			2				7
Large hoop net		4	4	6						14
Small hoop net		4	4	7						15
Mini fyke net	1		4			2				7
Seine			4							4
Tandem fyke net		2					2			4
Tandem mini fyke net		2					2			4
	----	----	----	----	----	----	----	----	----	----
SUBTOTAL	10	12	21	24	0	8	4	0	0	79
	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
	21	18	22	31	0	16	8	0	0	116

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



Table 4.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1993 in Pool 26 of the Mississippi River. See Table 4.1 for the list of sampling gears actually deployed in this study reach.

Table page: 1

Species	Common name	Scientific name	D	N	F	X	M	Y	S	HS	HL	G	T	TOTAL
1	Spotted gar	Lepisosteus oculatus	-	-	1	-	-	-	-	-	-	-	-	1
2	Longnose gar	Lepisosteus osseus	1	-	-	-	2	-	-	-	-	-	-	3
3	Shortnose gar	Lepisosteus platostomus	22	-	54	-	14	-	-	-	1	-	-	91
4	Bowfin	Amia calva	-	-	4	-	-	-	-	-	1	-	-	5
5	Goldeye	Hiodon alosoides	2	-	-	-	-	-	-	-	1	-	-	3
6	Mooneye	Hiodon tergisus	11	-	-	-	-	1	-	-	-	-	-	12
7	Skipjack herring	Alosa chrysochloris	8	-	-	-	-	1	-	-	-	-	-	9
8	Gizzard shad	Dorosoma cepedianum	4137	-	15	146	668	213	102	-	5	-	-	5286
9	Threadfin shad	Dorosoma petenense	3	-	-	-	10	-	1	-	-	-	-	14
10	Goldfish	Carassius auratus	-	-	1	-	-	-	-	-	-	-	-	1
11	Red shiner	Cyprinella lutrensis	9	-	-	-	2	-	-	-	-	-	-	11
12	Spotfin shiner	Cyprinella spiloptera	19	-	-	-	2	-	-	-	-	-	-	21
13	Common carp	Cyprinus carpio	300	-	18	8	9	2	-	6	3	-	-	346
14	Bighead carp	Hypophthalmichthys nobilis	-	-	1	-	-	-	-	-	-	-	-	1
15	Silver chub	Macrhybopsis storeriana	24	-	-	-	5	-	4	2	-	-	-	35
16	Golden shiner	Notemigonus crysoleucas	3	-	-	-	1	-	-	-	-	-	-	4
17	Emerald shiner	Notropis atherinoides	481	-	-	-	12	-	11	-	-	-	-	504
18	River shiner	Notropis biennis	31	-	-	-	28	1	-	-	-	-	-	60
19	Spottail shiner	Notropis hudsonius	1	-	-	-	1	-	-	-	-	-	-	2
20	Sand shiner	Notropis stramineus	1	-	-	-	-	-	-	-	-	-	-	1
21	Channel shiner	Notropis wickliffi	1	-	-	-	9	-	-	-	-	-	-	10
22	Fathead minnow	Pimephales promelas	2	-	-	-	-	-	-	-	-	-	-	2
23	Bullhead minnow	Pimephales vigilax	16	-	-	-	11	7	-	-	-	-	-	34
24	River carpsucker	Carpododes carpio	13	-	5	4	-	-	-	1	26	-	-	49
25	Quillback	Cariodes cyprinus	2	-	-	-	-	-	-	-	-	-	-	2
26	White sucker	Catostomus commersoni	-	-	-	-	1	-	-	-	-	-	-	1
27	Blue sucker	Cycleptus elongatus	-	-	-	-	2	-	-	-	-	-	-	2
28	Smallmouth buffalo	Ictiobus bubalus	173	-	27	6	43	12	-	6	156	-	-	423
29	Bigmouth buffalo	Ictiobus cyprinellus	273	-	2	-	106	-	-	-	1	-	-	382
30	Black buffalo	Ictiobus niger	5	-	-	-	-	-	-	-	-	-	-	5
31	Unidentified buffalo	Ictiobus sp.	16	-	-	-	696	-	-	-	-	-	-	712
32	Golden rehorse	Moxostoma erythrurum	3	-	-	-	-	-	-	-	-	-	-	3
33	Shorthead rehorse	Moxostoma macrolepidotum	9	-	-	-	1	-	-	-	-	-	-	10
34	Black bullhead	Ameiurus melas	2	-	13	-	2	-	-	-	-	-	-	17
35	Yellow bullhead	Ameiurus natalis	6	-	31	1	1	-	-	-	1	-	-	40
36	Brown bullhead	Ameiurus nebulosus	-	-	6	-	-	-	-	-	-	-	-	6
37	Blue catfish	Ictalurus furcatus	1	-	-	-	-	1	-	4	1	-	-	7
38	Channel catfish	Ictalurus punctatus	167	-	5	20	422	322	20	283	26	-	-	1265
39	Tadpole madtom	Noturus gyrinus	-	-	-	-	3	-	-	-	-	-	-	3

Gears: D - Day electrofishing  
N - Night electrofishing  
F - Fyke netting  
X - Tandem fyke netting  
M - Mini fyke netting  
Y - Tandem mini fyke netting  
S - Seining  
HS - Small hoop netting  
HL - Large hoop netting  
G - Gill netting  
T - Trawling (4.8-m bottom trawl)

Table 4.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1993 in Pool 26 of the Mississippi River. See Table 4.1 for the list of sampling gears actually deployed in this study reach.

Table page: 2

Species	Common name	Scientific name	D	N	F	X	M	Y	S	HS	HL	G	T	TOTAL
40	Freckled madtom	Noturus nocturnus	2	-	-	-	-	-	-	-	-	-	-	2
41	Flathead catfish	Pyiodictis olivaris	20	-	5	8	1	1	-	2	7	-	-	44
42	Grass pickerel	Esox americanus vermiculatus	-	-	-	-	2	-	-	-	-	-	-	2
43	Pirate perch	Aphredoderus sayanus	1	-	-	-	3	-	-	-	-	-	-	4
44	Starhead topminnow	Fundulus dispar	-	-	-	-	1	-	-	-	-	-	-	1
45	Western mosquitofish	Gambusia affinis	-	-	-	-	1	-	1	-	-	-	-	2
46	Brook silverside	Labidesthes sicculus	4	-	-	-	1	-	1	-	-	-	-	6
47	White bass	Morone chrysops	344	-	150	75	29	7	1	6	6	-	-	618
48	Yellow bass	Morone mississippiensis	1	-	4	6	3	-	-	-	-	-	-	14
49	Green sunfish	Lepomis cyanellus	61	-	-	2	16	2	-	-	-	-	-	81
50	Warmouth	Lepomis gulosus	19	-	-	-	2	-	-	-	-	-	-	21
51	Orangespotted sunfish	Lepomis humilis	74	-	6	-	20	3	-	-	-	-	-	103
52	Bluegill	Lepomis macrochirus	175	-	262	22	16	8	-	40	23	-	-	546
53	Redear sunfish	Lepomis microlophus	1	-	-	-	-	-	-	-	-	-	-	1
54	Largemouth bass	Micropterus salmoides	69	-	1	1	5	-	-	-	1	-	-	77
55	White crappie	Pomoxis annularis	16	-	47	6	4	-	-	-	2	-	-	75
56	Black crappie	Pomoxis nigromaculatus	15	-	73	16	23	1	-	-	4	-	-	132
57	Mud darter	Etheostoma asprigene	-	-	-	-	1	-	-	-	-	-	-	1
58	Logperch	Percina caprodes	2	-	-	-	4	-	-	-	-	-	-	6
59	Slenderhead darter	Percina phoxocephala	-	-	-	-	1	-	-	-	-	-	-	1
60	River darter	Percina shumardi	6	-	-	-	12	-	-	-	-	-	-	18
61	Sauger	Stizostedion canadense	22	-	7	1	4	-	-	-	-	-	-	34
62	Walleye	Stizostedion vitreum	4	-	1	-	2	-	-	-	-	-	-	7
63	Freshwater drum	Aplodinotus grunniens	160	-	55	197	7	7	1	6	1	-	-	434
			=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
			6738	0	794	519	2209	589	142	356	266	0	0	11613

Gears: D - Day electrofishing  
N - Night electrofishing  
F - Fyke netting  
X - Tandem fyke netting  
M - Mini fyke netting  
Y - Tandem mini fyke netting

S - Seining  
HS - Small hoop netting  
HL - Large hoop netting  
G - Gill netting  
T - Trawling (4.8-m bottom trawl)

Table 4.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by day electrofishing in Pool 26 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 4.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar	0.10 (0.10)							0.33 (0.33)		
Shortnose gar	1.20 (0.53)		0.50 (0.34)			0.92 (0.67)		2.00 (1.00)		
Goldeye	0.11 (0.11)					0.17 (0.17)				
Mooneye	0.46 (0.22)		0.30 (0.21)			0.67 (0.33)				
Skipjack herring	0.08 (0.06)		0.59 (0.42)		0.13 (0.13)	0.08 (0.08)				
Gizzard shad	137.41 (43.66)		19.72 (11.00)		220.50 (123.60)	161.09 (62.88)		96.00 (43.82)		
Threadfin shad					0.38 (0.26)					
Red shiner	0.46 (0.20)		0.30 (0.21)			0.25 (0.18)		1.00 (0.58)		
Spotfin shiner	1.41 (0.92)					0.83 (0.52)		3.00 (3.00)		
Common carp	13.09 (3.87)		3.80 (1.76)		11.50 (2.85)	7.12 (3.76)		28.33 (10.35)		
Silver chub	1.33 (0.69)				0.38 (0.38)	1.42 (1.00)		1.33 (0.67)		
Golden shiner					0.38 (0.18)					
Emerald shiner	35.12 (12.87)		0.39 (0.22)		0.38 (0.18)	21.11 (14.24)		73.67 (30.53)		
River shiner	0.60 (0.27)				2.63 (1.59)	0.86 (0.41)				
Spottail shiner					0.13 (0.13)					
Sand shiner					0.13 (0.13)					
Channel shiner	0.06 (0.06)					0.08 (0.08)				
Fathead minnow					0.25 (0.25)					
Bullhead minnow	0.53 (0.27)				1.00 (0.63)	0.50 (0.29)		0.67 (0.67)		
River carpsucker	0.18 (0.11)		0.69 (0.30)		0.50 (0.27)	0.08 (0.08)		0.33 (0.33)		
Quillback	0.06 (0.06)				0.13 (0.13)	0.08 (0.08)				
Smallmouth buffalo	0.88 (0.51)		0.89 (0.50)		19.00 (10.37)	1.00 (0.75)				
Bigmouth buffalo	0.93 (0.46)		0.20 (0.13)		32.75 (31.90)	0.50 (0.34)		1.00 (1.00)		
Black buffalo	0.36 (0.21)					0.25 (0.13)		0.67 (0.67)		
Golden redhorse					0.38 (0.26)					
Shorthead redhorse	0.27 (0.15)				0.63 (0.26)	0.25 (0.18)		0.33 (0.33)		
Black bullhead	0.06 (0.06)				0.13 (0.13)	0.08 (0.08)				
Yellow bullhead	0.01 (0.00)				0.75 (0.41)					
Blue catfish			0.10 (0.10)							

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 4.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by day electrofishing in Pool 26 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 4.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Channel catfish	8.66 (6.81)		1.00 (0.56)		0.38 (0.18)	12.67 (10.24)		0.67 (0.33)		
Freckled madtom	0.15 (0.11)					0.08 (0.08)		0.33 (0.33)		
Flathead catfish	0.87 (0.31)		0.20 (0.13)		0.50 (0.27)	1.00 (0.44)		0.67 (0.33)		
Pirate perch	0.06 (0.06)					0.08 (0.08)				
Brook silverside	0.15 (0.11)				0.25 (0.25)	0.08 (0.08)		0.33 (0.33)		
White bass	22.16 (6.06)		1.00 (0.39)		2.63 (1.44)	16.31 (4.50)		39.33 (18.46)		
Yellow bass	0.10 (0.10)							0.33 (0.33)		
Green sunfish	0.88 (0.35)		0.30 (0.30)		5.50 (3.02)	1.08 (0.50)		0.33 (0.33)		
Warmouth	0.14 (0.08)		0.20 (0.20)		1.88 (0.99)	0.17 (0.11)				
Orangespotted sunfish	0.59 (0.25)		1.60 (1.28)		6.38 (2.43)	0.42 (0.23)		0.67 (0.67)		
Bluegill	1.13 (0.27)		3.76 (1.65)		15.50 (5.41)	0.83 (0.30)		1.00 (0.58)		
Redear sunfish					0.13 (0.13)					
Largemouth bass	0.15 (0.06)		0.49 (0.34)		7.88 (2.77)	0.08 (0.08)				
White crappie	0.15 (0.11)		0.69 (0.26)		0.88 (0.88)	0.17 (0.17)				
Black crappie	0.21 (0.12)		1.10 (0.82)		0.13 (0.13)	0.25 (0.18)				
Logperch					0.25 (0.25)					
River darter	0.01 (0.01)				0.75 (0.75)					
Sauger	0.42 (0.30)				2.13 (1.46)	0.17 (0.11)		1.00 (1.00)		
Walleye					0.50 (0.38)					
Freshwater drum	10.28 (2.59)		0.70 (0.26)		0.88 (0.40)	7.67 (1.66)		18.00 (8.19)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 4.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by fyke netting in Pool 26 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 4.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Spotted gar	0.02 (0.02)		0.17 (0.17)							
Shortnose gar	1.09 (0.56)		9.10 (4.71)		0.26 (0.26)					
Bowfin	0.08 (0.04)		0.69 (0.34)							
Gizzard shad	1.10 (0.87)		1.89 (0.73)		0.53 (0.53)			1.01 (1.01)		
Goldfish	0.01 (0.01)				0.27 (0.27)					
Common carp	0.21 (0.10)		1.07 (0.40)		3.19 (3.19)					
Bighead carp	0.02 (0.02)		0.17 (0.17)							
River carpsucker	0.09 (0.04)		0.70 (0.34)		0.27 (0.27)					
Smallmouth buffalo	0.24 (0.18)		0.52 (0.35)		6.38 (6.38)					
Bigmouth buffalo	0.03 (0.02)		0.17 (0.17)		0.27 (0.27)					
Black bullhead	0.12 (0.08)		0.34 (0.22)		2.89 (2.89)					
Yellow bullhead	0.60 (0.51)		4.86 (4.27)		0.79 (0.79)					
Brown bullhead	0.11 (0.08)		0.85 (0.67)		0.26 (0.26)					
Channel catfish	0.50 (0.43)		0.53 (0.24)		0.26 (0.26)			0.51 (0.51)		
Flathead catfish	0.49 (0.43)		0.36 (0.23)		0.53 (0.31)			0.51 (0.51)		
White bass	4.69 (2.25)		24.90 (12.19)		0.26 (0.26)			2.02 (2.02)		
Yellow bass	0.07 (0.04)		0.52 (0.35)		0.27 (0.27)					
Orangespotted sunfish	0.11 (0.07)		0.86 (0.56)		0.26 (0.26)					
Bluegill	5.22 (3.85)		43.53 (32.56)		1.85 (1.09)					
Largemouth bass	0.01 (0.01)				0.26 (0.26)					
White crappie	0.76 (0.21)		5.49 (1.67)		3.96 (2.52)					
Black crappie	1.19 (0.55)		3.08 (1.54)		14.21 (10.46)			0.51 (0.51)		
Sauger	0.08 (0.04)		0.34 (0.22)		1.33 (1.33)					
Walleye	0.02 (0.02)		0.17 (0.17)							
Freshwater drum	0.60 (0.31)		2.56 (1.58)		10.90 (9.22)					

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 4.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by tandem fyke netting in Pool 26 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 4.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Gizzard shad	22.37 (12.26)	0.20 (0.20)		37.87 (20.87)						
Common carp	1.09 (0.94)	0.37 (0.19)		1.59 (1.59)						
River carpsucker	0.37 (0.26)	0.52 (0.52)		0.26 (0.26)						
Smallmouth buffalo	0.51 (0.39)	0.86 (0.86)		0.26 (0.26)						
Yellow bullhead	0.16 (0.16)			0.26 (0.26)						
Channel catfish	1.72 (1.56)	3.79 (3.79)		0.26 (0.26)						
Flathead catfish	1.23 (0.64)			2.09 (1.09)						
White bass	11.18 (2.73)	0.52 (0.52)		18.64 (4.64)						
Yellow bass	0.84 (0.48)	0.17 (0.17)		1.31 (0.81)						
Green sunfish	0.31 (0.31)			0.53 (0.53)						
Bluegill	2.24 (1.59)	2.42 (2.42)		2.12 (2.12)						
Largemouth bass	0.16 (0.16)			0.26 (0.26)						
White crappie	0.50 (0.38)	0.86 (0.86)		0.25 (0.25)						
Black crappie	2.47 (1.88)			4.20 (3.20)						
Sauger	0.16 (0.16)			0.26 (0.26)						
Freshwater drum	29.04 (24.22)	3.11 (3.11)		47.18 (41.18)						

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 4.3.4. Mean catch-per-unit-effort and (standard error) for fishes collected by mini fyke netting in Pool 26 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 4.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar	0.44 (0.44)							0.51 (0.51)		
Shortnose gar	0.15 (0.09)		0.63 (0.41)		2.93 (2.93)					
Gizzard shad	16.11 (10.30)		112.15 (86.35)		30.34 (29.29)			2.29 (1.12)		
Threadfin shad	2.01 (2.00)				0.25 (0.25)			2.34 (2.34)		
Red shiner	0.23 (0.22)				0.27 (0.27)			0.26 (0.26)		
Spotfin shiner	0.44 (0.25)							0.52 (0.30)		
Common carp	0.19 (0.05)		1.51 (0.43)		0.53 (0.53)					
Silver chub	0.90 (0.89)				0.25 (0.25)			1.04 (1.04)		
Golden shiner	0.02 (0.02)		0.20 (0.20)							
Emerald shiner	2.64 (1.31)							3.09 (1.54)		
River shiner	0.54 (0.46)		3.86 (3.86)		2.93 (2.93)					
Spottail shiner	0.22 (0.22)							0.26 (0.26)		
Channel shiner	0.07 (0.05)				2.38 (1.76)					
Bullhead minnow	0.23 (0.22)		1.84 (1.84)		0.53 (0.53)					
White sucker	0.03 (0.03)		0.22 (0.22)							
Blue sucker	0.01 (0.01)				0.53 (0.53)					
Smallmouth buffalo	0.88 (0.54)		6.54 (4.46)		3.72 (3.38)					
Bigmouth buffalo	0.77 (0.76)				28.19 (28.19)					
Shorthead redhorse	0.02 (0.02)		0.20 (0.20)							
Black bullhead	0.05 (0.05)		0.43 (0.43)							
Yellow bullhead	0.22 (0.22)							0.26 (0.26)		
Channel catfish	76.35 (71.40)		0.42 (0.42)		20.36 (20.36)			88.71 (83.66)		
Tadpole madtom	0.67 (0.67)							0.78 (0.78)		
Flathead catfish	0.01 (0.01)				0.26 (0.26)					
Grass pickerel	0.01 (0.01)				0.53 (0.53)					
Pirate perch	0.27 (0.22)		0.44 (0.44)					0.26 (0.26)		
Starhead topminnow	0.01 (0.01)				0.27 (0.27)					
Western mosquitofish	0.01 (0.01)				0.27 (0.27)					
Brook silverside	0.22 (0.22)							0.26 (0.26)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 4.3.4. Mean catch-per-unit-effort and (standard error) for fishes collected by mini fyke netting in Pool 26 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 4.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
White bass	3.67 (1.88)		1.08 (0.35)		2.06 (0.71)			4.08 (2.20)		
Yellow bass	0.65 (0.65)							0.77 (0.77)		
Green sunfish	1.40 (1.06)				2.58 (2.58)			1.56 (1.24)		
Warmouth	0.43 (0.43)							0.51 (0.51)		
Orangespotted sunfish	1.81 (1.29)		1.94 (1.21)		1.03 (1.03)			1.82 (1.50)		
Bluegill	0.45 (0.24)		1.50 (0.78)		2.07 (1.03)			0.25 (0.25)		
Largemouth bass	0.07 (0.04)		0.43 (0.26)		0.80 (0.80)					
White crappie	0.07 (0.03)		0.43 (0.26)		0.52 (0.30)					
Black crappie	1.83 (1.28)		2.24 (2.24)		1.28 (0.95)			1.79 (1.46)		
Mud darter	0.22 (0.22)							0.26 (0.26)		
Logperch	0.45 (0.25)				0.53 (0.53)			0.51 (0.30)		
Slenderhead darter	0.22 (0.22)							0.26 (0.26)		
River darter	0.31 (0.20)		2.61 (1.66)							
Sauger	0.05 (0.03)		0.22 (0.22)		0.80 (0.51)					
Walleye	0.03 (0.03)		0.22 (0.22)		0.27 (0.27)					
Freshwater drum	0.49 (0.44)		0.22 (0.22)		1.02 (0.59)			0.51 (0.51)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



Table 4.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by tandem mini fyke netting in Pool 26 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 4.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Mooneye	0.08 (0.08)	0.19 (0.19)								
Skipjack herring	0.15 (0.15)			0.26 (0.26)						
Gizzard shad	31.87 (30.14)	1.83 (1.59)		52.86 (51.30)						
Common carp	0.15 (0.15)	0.37 (0.37)								
River shiner	0.15 (0.15)			0.26 (0.26)						
Bullhead minnow	0.53 (0.53)	1.30 (1.30)								
Smallmouth buffalo	0.91 (0.91)	2.22 (2.22)								
Blue catfish	0.15 (0.15)			0.26 (0.26)						
Channel catfish	26.23 (19.87)	45.50 (45.50)		12.76 (11.72)						
Flathead catfish	0.07 (0.07)	0.17 (0.17)								
White bass	0.75 (0.21)	0.70 (0.35)		0.78 (0.26)						
Green sunfish	0.31 (0.31)			0.52 (0.52)						
Orangespotted sunfish	0.29 (0.21)	0.33 (0.33)		0.26 (0.26)						
Bluegill	1.15 (0.17)	0.19 (0.19)		1.82 (0.26)						
Black crappie	0.15 (0.15)			0.26 (0.26)						
Freshwater drum	1.07 (0.46)			1.82 (0.78)						

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 4.3.6. Mean catch-per-unit-effort and (standard error) for fishes collected by small hoop netting in Pool 26 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 4.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Common carp	0.21 (0.21)					0.31 (0.31)				
Silver chub	0.06 (0.06)					0.10 (0.10)				
River carpsucker		0.09 (0.09)								
Smallmouth buffalo	0.17 (0.08)	0.09 (0.09)				0.20 (0.11)		0.12 (0.12)		
Blue catfish	0.13 (0.10)					0.15 (0.15)		0.12 (0.12)		
Channel catfish	3.32 (1.71)	16.96 (15.36)				3.82 (2.48)		1.60 (1.05)		
Flathead catfish	0.03 (0.03)	0.08 (0.08)				0.05 (0.05)				
White bass	0.20 (0.12)					0.24 (0.17)		0.12 (0.12)		
Bluegill	0.08 (0.04)	2.96 (2.08)		1.01 (0.01)						
Freshwater drum	0.14 (0.07)			0.50 (0.00)		0.20 (0.11)				

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 4.3.7. Mean catch-per-unit-effort and (standard error) for fishes collected by large hoop netting in Pool 26 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 4.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

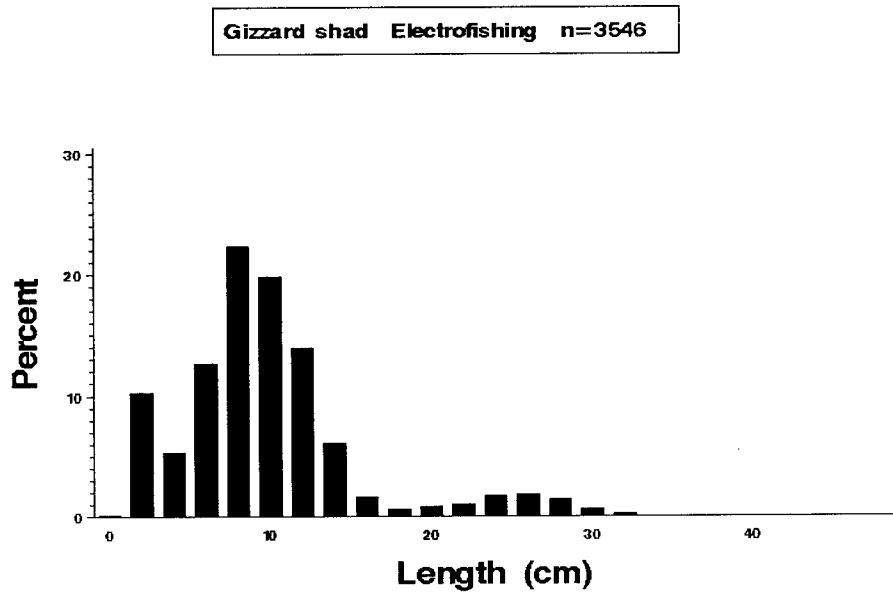
Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shortnose gar	0.01 (0.01)			0.25 (0.25)						
Bowfin		0.08 (0.08)								
Goldeye	0.01 (0.01)			0.25 (0.25)						
Gizzard shad	0.08 (0.07)	0.18 (0.11)		0.25 (0.25)		0.11 (0.11)				
Common carp	0.04 (0.04)	0.17 (0.11)				0.06 (0.06)				
River carpsucker	0.10 (0.04)	1.70 (0.86)		1.26 (0.76)		0.05 (0.05)				
Smallmouth buffalo	1.78 (1.12)	9.62 (4.87)		0.25 (0.25)		2.34 (1.67)		0.10 (0.10)		
Bigmouth buffalo		0.08 (0.08)								
Yellow bullhead		0.09 (0.09)								
Blue catfish		0.09 (0.09)								
Channel catfish	0.34 (0.12)	1.39 (1.01)				0.17 (0.08)		0.69 (0.37)		
Flathead catfish	0.25 (0.11)					0.33 (0.16)		0.10 (0.10)		
White bass	0.02 (0.01)	0.33 (0.33)		0.50 (0.50)						
Bluegill	0.03 (0.03)	1.88 (1.45)								
Largemouth bass	0.01 (0.01)			0.25 (0.25)						
White crappie	0.01 (0.01)			0.50 (0.50)						
Black crappie	0.03 (0.03)			1.01 (1.01)						
Freshwater drum	0.04 (0.04)					0.05 (0.05)				

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

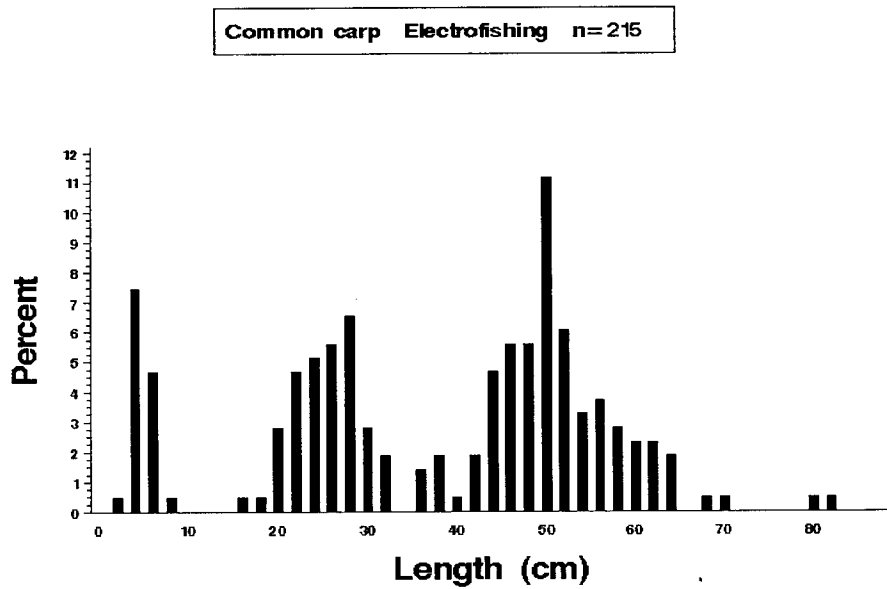
Table 4.3.8. Mean catch-per-unit-effort and (standard error) for fishes collected by seining in Pool 26 of the Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 4.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Gizzard shad	25.50 (17.23)							25.50 (17.24)		
Threadfin shad	0.25 (0.25)							0.25 (0.25)		
Silver chub	1.00 (0.71)							1.00 (0.71)		
Emerald shiner	2.75 (1.25)							2.75 (1.25)		
Channel catfish	5.00 (1.68)							5.00 (1.68)		
Western mosquitofish	0.25 (0.25)							0.25 (0.25)		
Brook silverside	0.25 (0.25)							0.25 (0.25)		
White bass	0.25 (0.25)							0.25 (0.25)		
Freshwater drum	0.25 (0.25)							0.25 (0.25)		

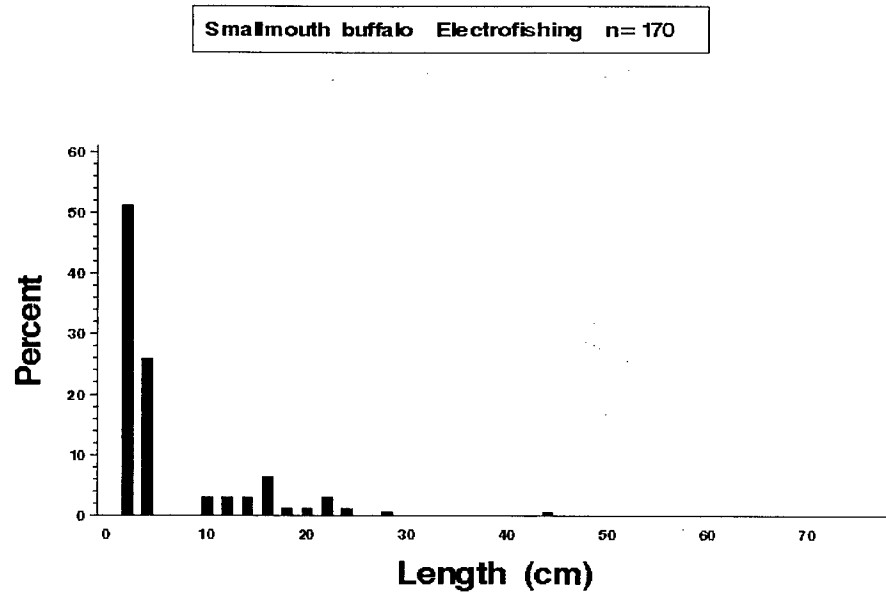
Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



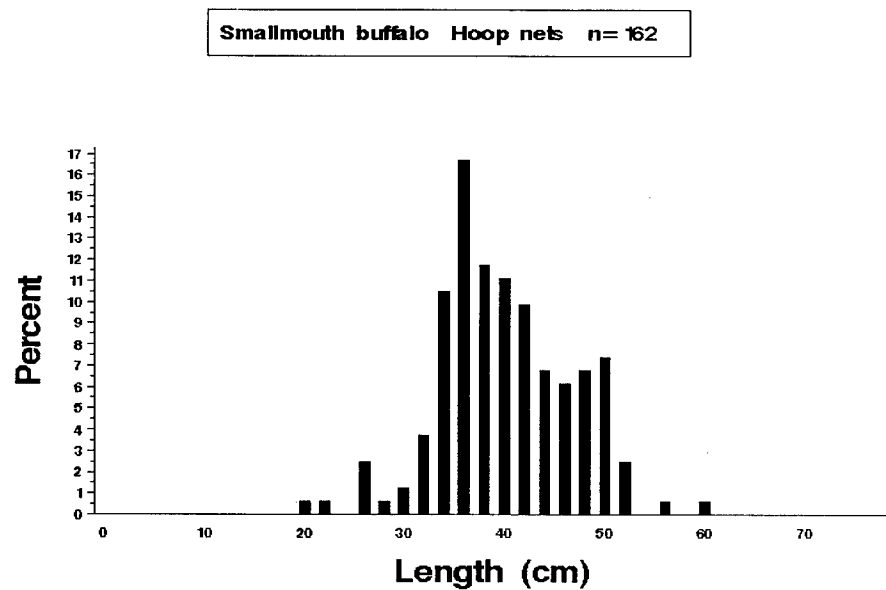
**Figure 4.2.** Length distributions (*length*) as a percentage of catch (*percent*) for gizzard shad (*Dorosoma cepedianum*) collected by electrofishing in Upper Mississippi River Pool 26 during 1993.



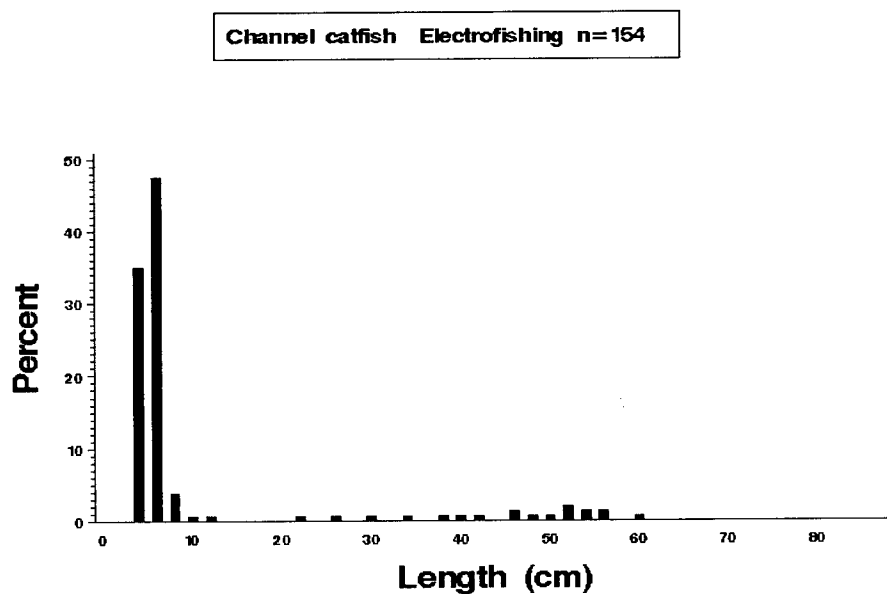
**Figure 4.3.** Length distributions (*length*) as a percentage of catch (*percent*) for common carp (*Cyprinus carpio*) collected by electrofishing in Upper Mississippi River Pool 26 during 1993.



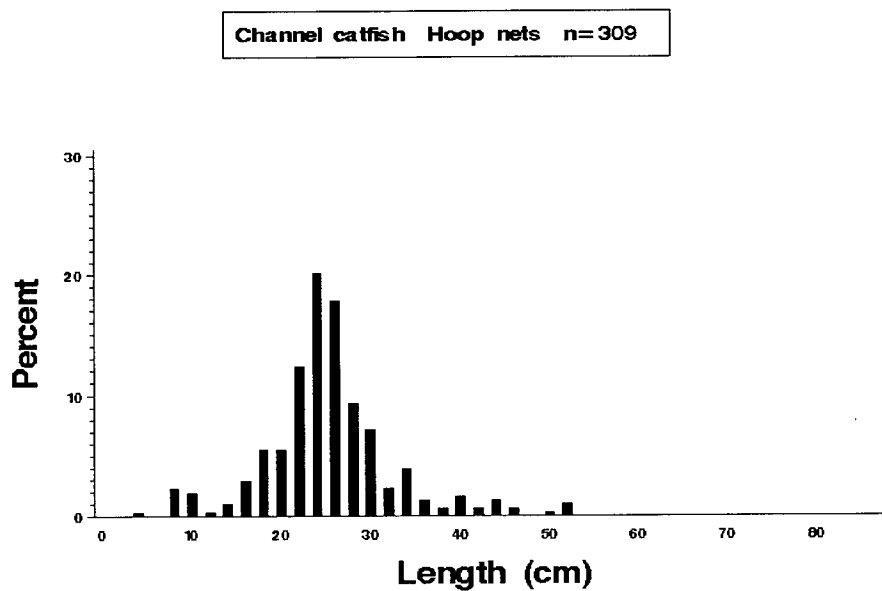
**Figure 4.4.** Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by electrofishing in Upper Mississippi River Pool 26 during 1993.



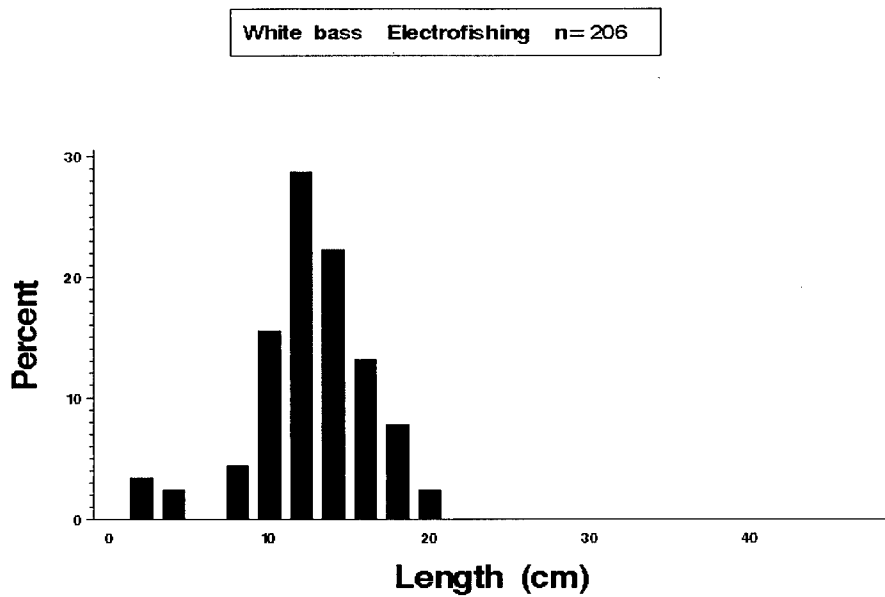
**Figure 4.5.** Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by large and small hoop netting in Upper Mississippi River Pool 26 during 1993.



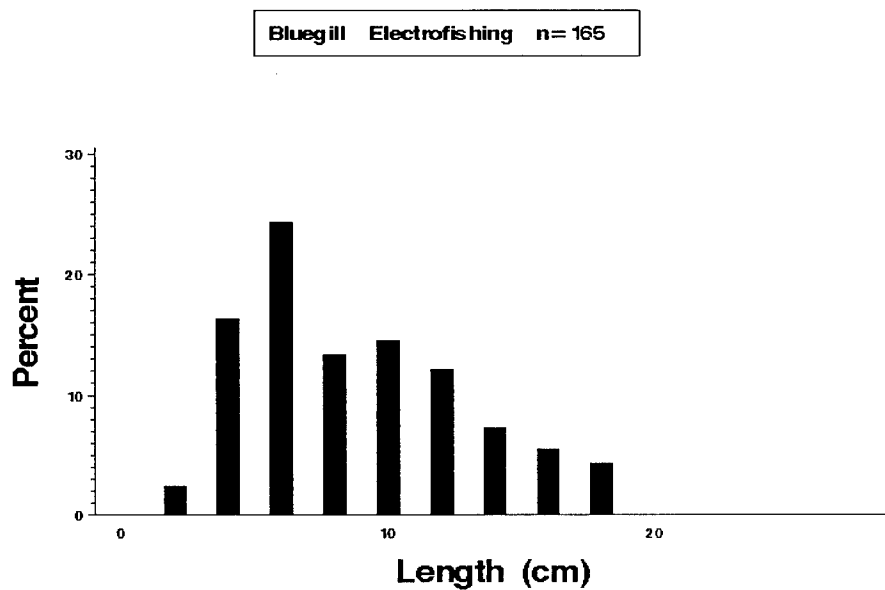
**Figure 4.6.** Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by electrofishing in Upper Mississippi River Pool 26 during 1993.



**Figure 4.7.** Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by large and small hoop netting in Upper Mississippi River Pool 26 during 1993.

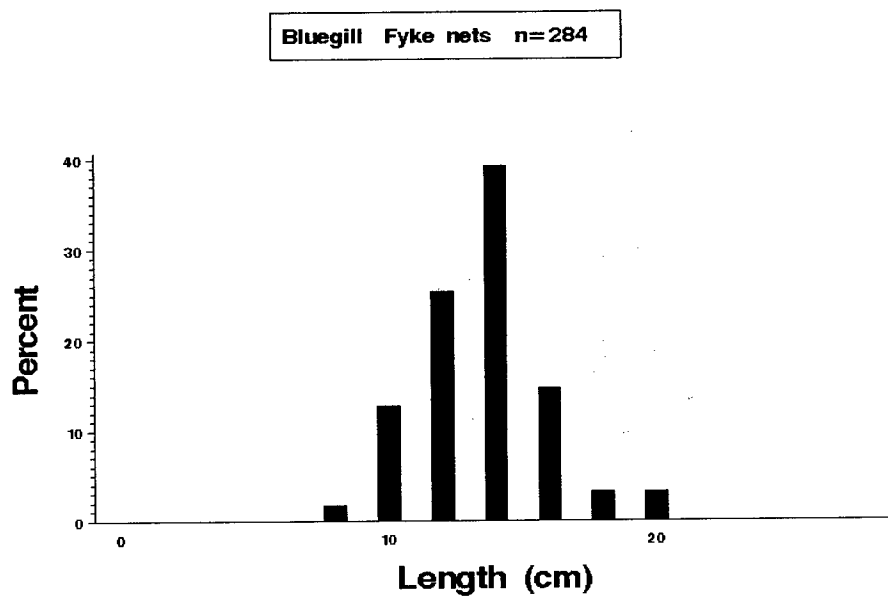


**Figure 4.8.** Length distributions (*length*) as a percentage of catch (*percent*) for white bass (*Morone chrysops*) collected by electrofishing in Upper Mississippi River Pool 26 during 1993.

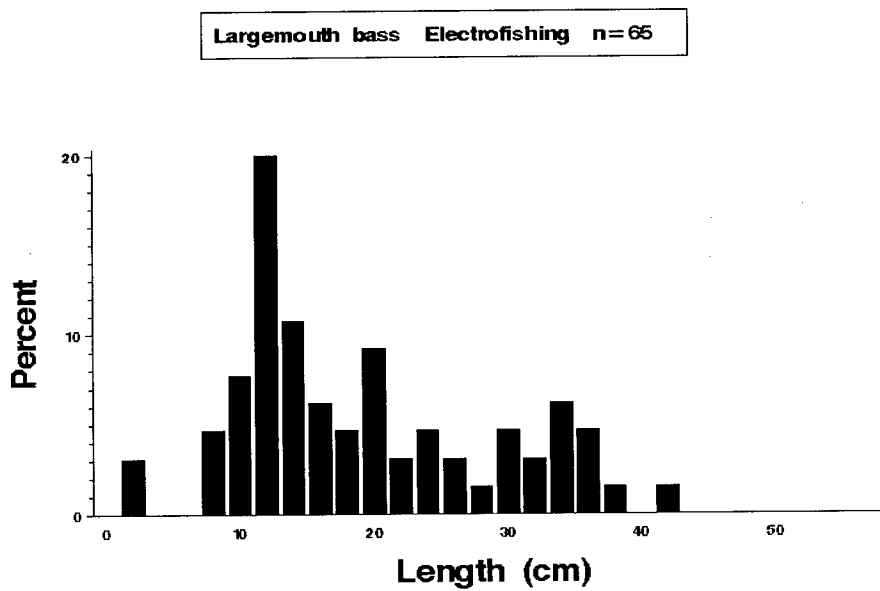


**Figure 4.9.** Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by electrofishing in Upper Mississippi River Pool 26 during 1993.

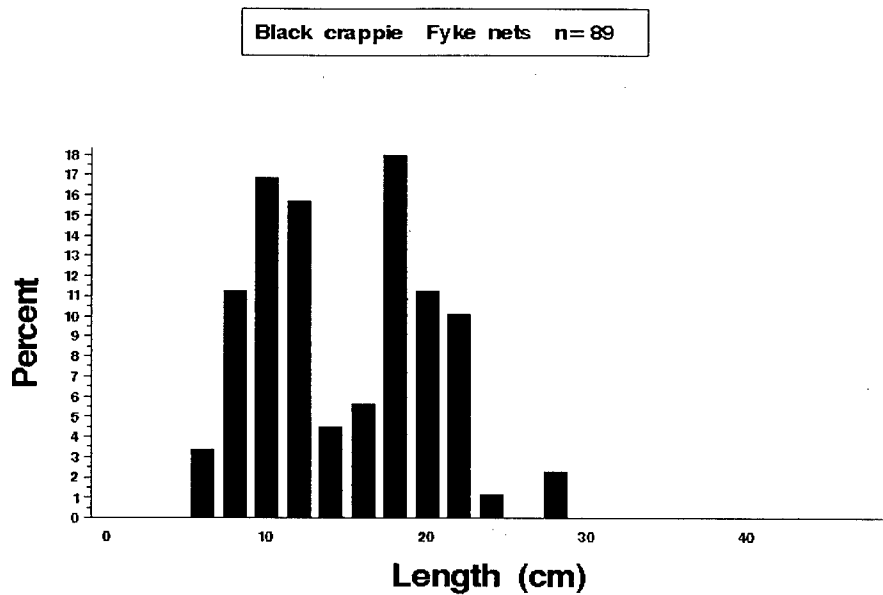




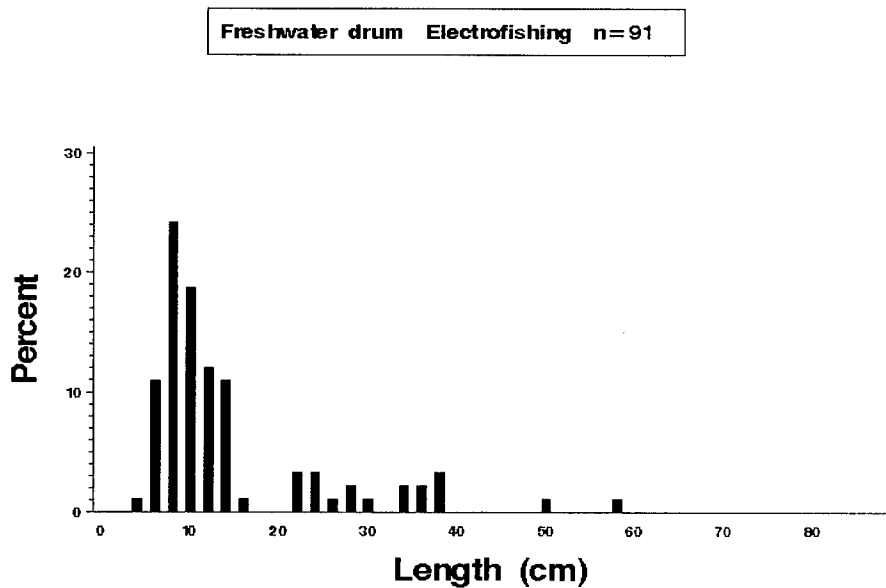
**Figure 4.10.** Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by fyke netting in Upper Mississippi River Pool 26 during 1993.



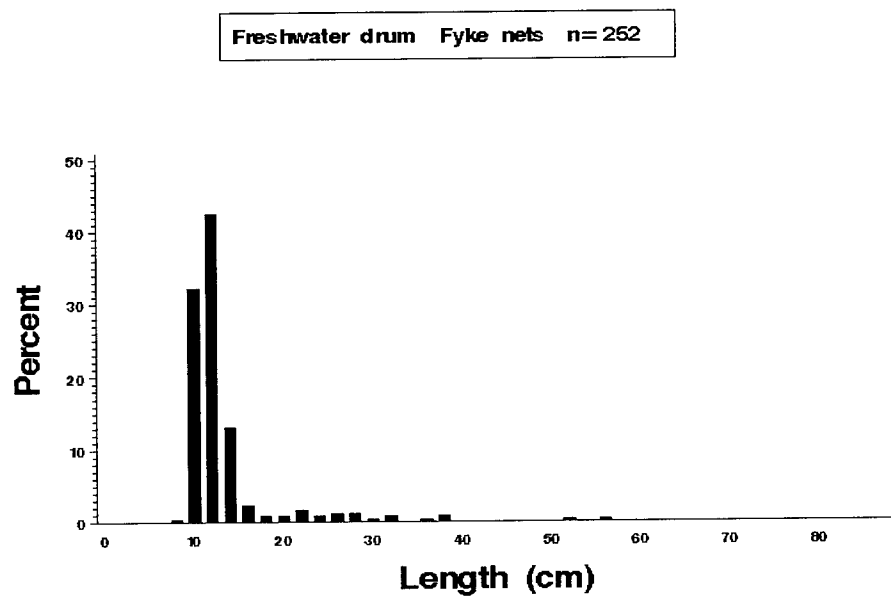
**Figure 4.11.** Length distributions (*length*) as a percentage of catch (*percent*) for largemouth bass (*Micropterus salmoides*) collected by electrofishing in Upper Mississippi River Pool 26 during 1993.



**Figure 4.12.** Length distributions (*length*) as a percentage of catch (*percent*) for black crappie (*Pomoxis nigromaculatus*) collected by fyke netting in Upper Mississippi River Pool 26 during 1993.



**Figure 4.13.** Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by electrofishing in Upper Mississippi River Pool 26 during 1993.



**Figure 4.14.** Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by fyke netting in Upper Mississippi River Pool 26 during 1993.

## **Chapter 5. Mississippi River Open Reach**

by

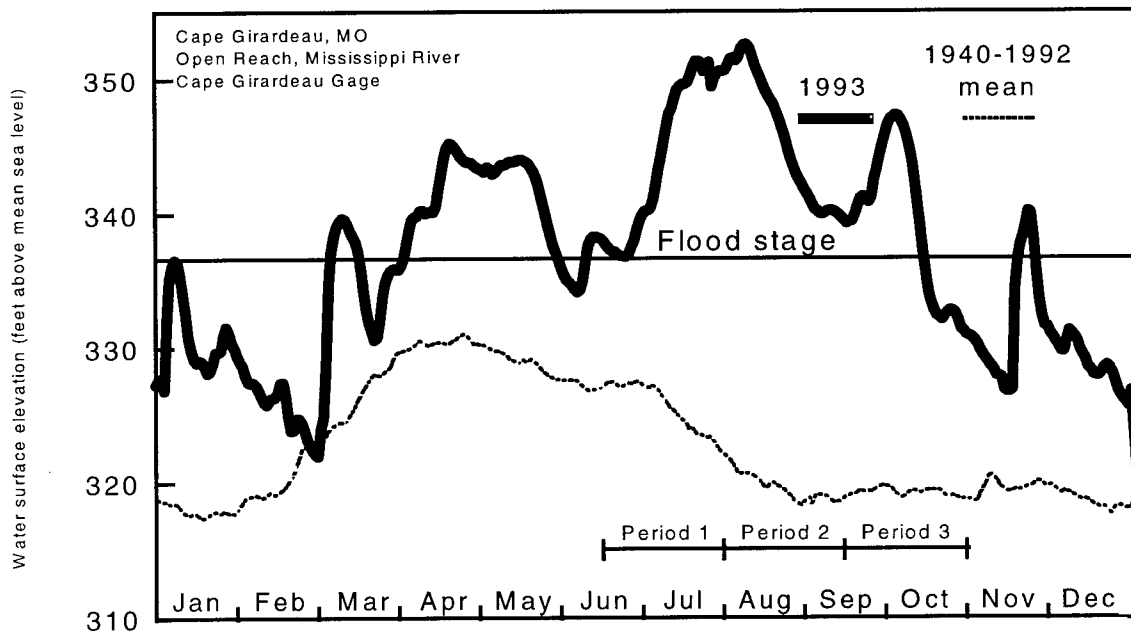
Michael D. Petersen and David P. Herzog

Missouri Department of Conservation  
3815 E. Jackson Boulevard  
Jackson, Missouri 63755

## Hydrograph

Open Mississippi River water stages are influenced by discharges from the Upper Mississippi, Missouri, Illinois, and to a lesser extent, Ohio Rivers. Water stage may frequently fluctuate in the open river by 3–5 feet/week and more than 20 feet/year. At stages above 22.0 feet (Cape Girardeau Gage, 326 feet above mean sea level), successful gear sets are reduced by high water velocity and flooded riparian vegetation. At stages between 22.0 and 17.0 feet, wing dams become totally to partly submerged. Water velocity above submerged wing dams limits the use of most sampling gear. At stages below 17.0 feet, closing structures emerge making it difficult to access side channels. Gear must be carried in or private landowner permission must be granted to access isolated waters. The SCB is the most difficult stratum to sample, primarily because of access problems.

During the flood of 1993, river stage at Cape Girardeau reached 48.4 feet, the highest flood crest recorded since records were kept in 1891. In 1993, water stages were unusually higher than normal in spring, summer, and fall, but were near normal in winter. The water stage typically fluctuated 4–10 feet during 2-week periods. The lowest stage occurred on March 1 (17.0 feet) and the highest stage occurred on August 8 (48.4 feet). Water stages during LTRMP sampling in 1993 could be characterized as high and unstable (Figure 5.1). The U.S. Army Corps of Engineers discharge data were obtained from the Environmental Management Technical Center (Wlosinski et al. 1995).



**Figure 5.1.** Daily water surface elevation from Cape Girardeau Gage for the Upper Mississippi River Open Reach, during 1993 and mean elevation since 1940. The U.S. Army Corps of Engineers discharge data were obtained from the Environmental Management Technical Center (Wlosinski et al. 1995).

## Summary of Sampling Effort

In 1993, 405 random and fixed-site samples were planned consisting of 135 samples in each of three periods. We planned 336 random samples in three strata: MCBU (composing 27% of the total planned random sampling effort), MCBW (25%), and SCB (48%). We also planned 69 samples in three fixed sites—two TRI (52%) and one MCBU stratum (49%).

We completed 100 samples (25% of what we planned to do) in 1993 consisting of 24 and 76 samples in periods 1 and 3, respectively (Table 5.1). We completed 79 random samples, 21 TRI fixed-site samples and 8 MCBU fixed-site samples. Flood conditions were responsible for the low number of completed samples in 1993. No MCBW sites were sampled in 1993.

## Total Catch by Gear

Historically, 129 fish species have been collected from the open river (Pitlo et al. 1995). In 1993, we collected 66 species and one hybrid representing 17,642 fish (Table 5.2). This total does not include 276 fish <30 mm long identified only to genus, or identified as larval fish. The five most numerically abundant species were black crappie (7,120), gizzard shad (6,057), white bass (1,701), freshwater drum (609), and white crappie (384).

The following summarizes total fish catch and number of species by gear: day electrofishing, 5,606 fish and 36 species; fyke netting, 10,396 fish and 29 species (including 6,500 black crappie in one net); mini fyke netting, 1,283 fish and 52 species and 1 hybrid; small hoop netting, 212 fish and 13 species; large hoop netting, 98 fish and 14 species; and gill netting, 47 fish and 14 species.

In 1993, nine new species were collected: central stoneroller, golden shiner, tadpole madtom, pirate perch, flier, redear sunfish, logperch, slenderhead darter, walleye, and green sunfish × orangespotted sunfish. Two Missouri-listed species were collected: mooneye and blue sucker. The blue sucker is a candidate for Federal listing.

## Random Sampling, Mean *C/f* by Gear and Stratum

### *Day Electrofishing*

Gizzard shad (91.45 fish/15 min), freshwater drum (14.41), and green sunfish (13.31) had the highest day electrofishing *C/f* when combining all strata (Table 5.3.1). The highest *C/f* by stratum were MCBU: gizzard shad (95.50), freshwater drum and green sunfish (14.75, note standard error), and white bass (8.50); and SCB: gizzard shad (61.71), freshwater drum (11.90), and white bass (5.57).

### *Fyke Net*

White bass (8.61 fish/net-day), freshwater drum (8.03), and goldeye (2.98) had the highest fyke netting *C/f* in SCB stratum (Figure 5.3.2). Fyke nets were set in other strata, but fish species were not caught with sufficient frequency for data analysis.

### *Mini Fyke Net*

Freshwater drum (6.92 fish/net-day), gizzard shad (6.28), and bigmouth buffalo (4.53) had the highest mini fyke netting *C/f* when combining all strata (Table 5.3.3). The highest *C/f* by stratum were MCBU: freshwater drum (7.45), gizzard shad (6.63), and bigmouth buffalo (4.34); and SCB: bigmouth buffalo (5.92), channel catfish (4.65), and gizzard shad (3.69).

### *Small Hoop Net*

Channel catfish (1.10 fish/net-day), white bass (0.35), and freshwater drum (0.33) had the highest small hoop netting *C/f* when combining all strata (Table 5.3.4). The highest *C/f* by stratum were MCBU: freshwater drum and white bass (0.38), channel catfish (0.26), and flathead catfish (0.13); and SCB: channel catfish (7.36), flathead catfish (0.39), and shortnose gar (0.20).

### *Large Hoop Net*

Gizzard shad (1.38 fish/net-day), river carpsucker (0.58), and smallmouth buffalo (0.38) had the highest large hoop netting *C/f* when combining all strata (Table 5.3.5). The highest *C/f* by stratum were MCBU: gizzard shad (1.52), river carpsucker (0.63), and flathead catfish (0.24); and SCB: smallmouth buffalo (1.46), gizzard shad (0.39), and channel catfish (0.37).

## **Fixed Sampling, Mean *C/f* by Gear and Stratum**

### *Day Electrofishing*

Gizzard shad (326.63 fish/15 min), goldeye (6.50), and silver chub (3.00) had the highest day electrofishing *C/f* in the MCBU stratum (Table 5.4.1). Gizzard shad (1,113.33), white bass (53.67), and white crappie (33.33) had the highest *C/f* in the TRI stratum.

### *Fyke Net*

Black crappie (3,504.59 fish/net-day), gizzard shad (632.65), and white crappie (62.24) had the highest fyke netting *C/f* (note standard error) in the MCBU stratum (Table 5.4.2). White bass (195.68), white crappie (16.54), and yellow bass (14.19) had the highest *C/f* in the TRI stratum.

### *Mini Fyke Net*

Black crappie (59.93 fish/net-day), freshwater drum (59.28), and white crappie (4.26) had the highest mini fyke netting *C/f* in the MCBU stratum (Table 5.4.3). Bluntnose darter (6.24), mud darter (6.18), and freshwater drum (3.39) had the highest *C/f* in the TRI stratum.

### *Small Hoop Net*

White bass (10.48 fish/net-day) and freshwater drum (0.25) had the highest small hoop netting *C/f* (note standard error) in the MCBU stratum (Table 5.4.4). Small hoop nets were set in other strata, but fish species were not caught with sufficient frequency for data analysis.

### *Large Hoop Net*

White crappie (3.10 fish/net-day), common carp (0.95), and gizzard shad and black crappie (0.48) had the highest large hoop netting *C/f* (note standard error) in the TRI stratum (Table 5.4.5). Large hoop nets were set in other strata, but fish species were not caught with sufficient frequency for data analysis.

### *Gill Net*

Freshwater drum (5.11 fish/net-day), common carp (4.33), and gizzard shad (2.89) had the highest gill netting *C/f* in the TRI stratum (Table 5.4.6). Because of the high river stages, no other stratum were sampled.

## **Length Distributions of Selected Species**

Length–frequency histograms are presented for selected species in Figures 5.2 to 5.15. Meaningful biological interpretation of the histograms is limited because of small sample size or size selectivity of the gear (Anderson and Neumann 1996). Despite these biases, some river managers may find the histograms useful, therefore we have included them in this report. No age–growth data are available at this time for the open Mississippi River study reach.

### *Gizzard Shad*

We collected 4,659 gizzard shad by day electrofishing, and measured 1,758 subsampled gizzard shad for length–frequency (Figure 5.2). The length–frequency distribution was composed largely of 60 12-cm-long fish. The 2,901 unmeasured gizzard shad were not applied to the length–frequency distribution. Most unmeasured gizzard shad were between 6 and 12 cm long.

### *Common Carp*

Thirty-nine common carp were collected by day electrofishing (Figure 5.3). The length–frequency distribution was composed of 22- to 70-cm-long fish, with modes of 30 and 52 cm.

### *Smallmouth Buffalo*

Thirty-two smallmouth buffalo were collected by day electrofishing (Figure 5.4). The length–frequency distribution was composed of 14- to 48-cm-long fish and having a mode at 18 cm.



Thirty-one smallmouth buffalo were collected by small and large hoop nets (Figure 5.5). The length–frequency distribution was composed of 14- to 66-cm-long fish. Most of smallmouth buffalo were between 42 and 56 cm long.

### *Channel Catfish*

Twelve channel catfish were collected by day electrofishing (Figure 5.6). The length–frequency distribution was composed of 4- to 58-cm-long fish.

One hundred thirty-three channel catfish were collected by small and large hoop nets (Figure 5.7). The length–frequency distribution was composed of 14- to 66-cm-long fish and having a mode at 20 cm.

### *White Bass*

Two hundred thirty-four white bass were collected by day electrofishing (Figure 5.8). The length–frequency distribution was composed of 8- to 38-cm-long fish and having a mode at 12 cm.

### *Bluegill*

Thirty-four bluegill were collected by day electrofishing (Figure 5.9). The length–frequency distribution was composed of 2- to 20-cm-long fish and having a mode at 6 cm.

Sixty-nine bluegill were collected by fyke netting (Figure 5.10). The length–frequency distribution was composed of 6- to 20-cm-long fish and having a mode at 8 cm.

### *Largemouth Bass*

Sixteen largemouth bass were collected by day electrofishing (Figure 5.11). The length–frequency distribution was composed of 12- to 18-cm-long fish and having a mode at 18 cm.

### *White Crappie*

Two hundred twenty-five white crappie were collected by fyke netting (Figure 5.12). The length–frequency distribution was composed of 8- to 34-cm-long fish, with modes at 10 and 24 cm.

### *Black Crappie*

We collected 6,901 black crappie with fyke nets and measured 243 subsampled black crappie for length–frequency (Figure 5.13). The length–frequency distribution was composed of 8- to 18-cm-long fish. The 6,658 unmeasured black crappie were not applied to the length–frequency distribution. Most of the unmeasured black crappie were between 10 and 12 cm long. A single fyke net collected 6,500 black crappie in one 24-h set.

### *Freshwater Drum*

One hundred thirty-five freshwater drum were collected by day electrofishing (Figure 5.14). The length–frequency distribution was composed of 4- to 46-cm-long fish, with modes at 6 and 32 cm.

One hundred sixty-three freshwater drum were collected by fyke netting (Figure 5.15). The length–frequency shows a bimodal distribution, with modes at 12 and 30 cm.

Table 5.1. Allocation of fish sampling effort among strata by the Long Term Resource Monitoring Program in the open Mississippi River during 1993. Table entries are numbers of successfully completed standardized monitoring collections.

Table page: 1

Sampling period = 1: June 15 - July 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	TRI	TWZ	TOTAL
Fyke net			4	1				2		7
Gill net								1		1
Mini fyke net			8	5				2		15
Trawling				1						1
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SUBTOTAL	0	0	12	7	0	0	0	5	0	24

Sampling period = 3: September 15 - October 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	TRI	TWZ	TOTAL
Day electrofishing			8	6				3		17
Fyke net			4	1				4		9
Gill net			1					1		2
Large hoop net			8	5				2		15
Small hoop net			8	5				2		15
Mini fyke net			8	6				4		18
	----	----	---	----	----	----	----	---	---	-----
SUBTOTAL	0	0	37	23	0	0	0	16	0	76
	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
	0	0	49	30	0	0	0	21	0	100

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 5.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1993 in the open Mississippi River. See Table 5.1 for the list of sampling gears actually deployed in this study reach.

Table page: 1

Species	Common name	Scientific name	D	N	F	X	M	Y	S	HS	HL	G	T	TOTAL
1	Chestnut lamprey	Ichthyomyzon castaneus	2	-	-	-	2	-	-	-	-	1	-	5
2	Shovelnose sturgeon	Scaphirhynchus platyrhynchus	-	-	-	-	-	-	-	-	1	-	-	1
3	Spotted gar	Lepisosteus oculatus	-	-	1	-	-	-	-	-	-	-	-	1
4	Longnose gar	Lepisosteus osseus	4	-	-	-	1	-	-	-	-	-	-	5
5	Shortnose gar	Lepisosteus platostomus	1	-	5	-	6	-	-	3	3	-	-	18
6	Bowfin	Amia calva	-	-	1	-	-	-	-	-	-	-	-	1
7	Goideye	Hiodon alosoides	39	-	30	-	18	-	-	-	-	1	-	88
8	Mooneye	Hiodon tergisus	4	-	-	-	-	-	-	-	-	-	-	4
9	American eel	Anguilla rostrata	-	-	6	-	1	-	-	-	-	-	-	7
10	Skipjack herring	Alosa chrysochloris	1	-	-	-	11	-	-	-	-	-	-	14
11	Gizzard shad	Dorosoma cepedianum	4659	-	1253	-	116	-	-	1	20	8	-	6057
12	Threadfin shad	Dorosoma petenense	24	-	1	-	-	-	-	-	-	-	-	25
13	Central stoneroller	Camptostoma anomalum	-	-	-	-	1	-	-	-	-	-	-	1
14	Grass carp	Ctenopharyngodon idella	-	-	-	-	-	-	-	-	-	-	-	2
15	Red shiner	Cyprinella lutrensis	33	-	-	-	10	-	-	-	-	2	-	43
16	Spotfin shiner	Cyprinella spiloptera	1	-	-	-	-	-	-	-	-	-	-	1
17	Blacktail shiner	Cyprinella venusta	2	-	-	-	-	-	-	-	-	-	-	2
18	Common carp	Cyprinus carpio	39	-	30	-	52	-	-	3	7	7	-	138
19	Speckled chub	Macrhybopsis aestivalis	-	-	-	-	3	-	-	-	-	-	-	3
20	Silver chub	Macrhybopsis storeriana	17	-	-	-	15	-	-	-	-	-	-	32
21	Golden shiner	Notemigonus crysoleucas	-	-	-	-	1	-	-	-	-	-	-	1
22	Emerald shiner	Notropis atherinoides	38	-	-	-	42	-	-	-	-	-	-	80
23	River shiner	Notropis biennis	-	-	-	-	2	-	-	-	-	-	-	2
24	Silverband shiner	Notropis shumardi	-	-	-	-	20	-	-	-	-	-	-	20
25	Channel shiner	Notropis wickliffi	-	-	-	-	8	-	-	-	-	-	-	8
26	Unidentified shiner	Notropis sp.	-	-	-	-	1	-	-	-	-	-	-	1
27	Pugnose minnow	Opsopoeodus emiliae	-	-	-	-	1	-	-	-	-	-	-	1
28	Bullhead minnow	Pimephales vigilax	1	-	-	-	16	-	-	-	-	-	-	17
29	River carpsucker	Carpionodes carpio	13	-	13	-	-	-	-	-	8	6	-	40
30	Quillback	Carpionodes cyprinus	3	-	9	-	1	-	-	-	-	1	-	14
31	Blue sucker	Cycleptus elongatus	-	-	-	-	9	-	-	-	-	-	-	9
32	Smallmouth buffalo	Ictiobus bubalus	32	-	62	-	1	-	-	6	25	5	-	131
33	Bigmouth buffalo	Ictiobus cyprinellus	15	-	12	-	126	-	-	-	1	-	-	154
34	Black buffalo	Ictiobus niger	6	-	-	-	-	-	-	-	-	4	-	10
35	Unidentified buffalo	Ictiobus sp.	-	-	-	-	112	-	-	-	-	-	-	112
36	Shorthorn redhorse	Moxostoma macrolepidotum	-	-	-	-	-	-	-	-	-	-	-	2
37	Black bullhead	Ameiurus melas	-	-	57	-	1	-	-	1	-	-	-	59
38	Unidentified bullhead	Ameiurus sp.	-	-	-	-	3	-	-	-	-	-	-	3
39	Blue catfish	Ictalurus furcatus	-	-	2	-	4	-	-	2	1	3	-	12

Gears: D - Day electrofishing  
N - Night electrofishing  
F - Fyke netting  
X - Tandem fyke netting  
M - Mini fyke netting  
Y - Tandem mini fyke netting

S - Seining  
HS - Small hoop netting  
HL - Large hoop netting  
G - Gill netting  
T - Trawling (4.8-m bottom trawl)

Table 5.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1993 in the open Mississippi River. See Table 5.1 for the list of sampling gears actually deployed in this study reach.

Table page: 2

Species	Common name	Scientific name	D	N	F	X	M	Y	S	HS	HL	G	T	TOTAL
40	Channel catfish	Ictalurus punctatus	12	-	24	-	101	-	-	125	8	4	-	274
41	Tadpole madtom	Noturus gyrinus	-	-	-	-	1	-	-	-	-	-	-	1
42	Freckled madtom	Noturus nocturnus	-	-	-	-	3	-	-	-	-	-	-	3
43	Flathead catfish	Pylodictis olivaris	5	-	11	-	6	-	-	7	6	-	-	35
44	Pirate perch	Aphredoderus sayanus	1	-	-	-	4	-	-	-	-	-	-	5
45	Blackstripe topminnow	Fundulus notatus	-	-	-	-	6	-	-	-	-	-	-	6
46	Western mosquitofish	Gambusia affinis	1	-	-	-	26	-	-	-	-	-	-	27
47	Brook silverside	Labidesthes sicculus	5	-	-	-	4	-	-	-	-	-	-	9
48	White bass	Morone mississippiensis	234	-	1373	-	42	-	-	49	1	2	-	1701
49	Yellow bass	Morone saxatilis	1	-	93	-	1	-	-	-	-	1	-	96
50	Striped bass	Centrarchus macropterus	-	-	-	-	-	-	-	-	-	2	-	2
51	Flier	Lepomis cyanellus	-	-	-	-	1	-	-	-	-	-	-	1
52	Green sunfish	Lepomis gulosus	93	-	40	-	15	-	-	-	-	-	-	148
53	Warmouth	Lepomis humilis	-	-	-	-	5	-	-	-	-	-	-	5
54	Orangespotted sunfish	Lepomis macrochirus	13	-	16	-	22	-	-	-	-	-	-	51
55	Bluegill	Lepomis microlophus	34	-	69	-	36	-	-	-	-	-	-	139
56	Redear sunfish	L. cyanellus x L. humilis	-	-	4	-	-	-	-	-	-	-	-	4
57	Green sunfish x orangespotted	Micropterus punctulatus	-	-	-	-	1	-	-	-	-	-	-	1
58	Spotted bass	Micropterus salmoides	3	-	-	-	2	-	-	-	-	-	-	5
59	Largemouth bass	Pomoxis annularis	16	-	19	-	1	-	-	-	-	-	-	36
60	White crappie	Pomoxis nigromaculatus	100	-	225	-	39	-	-	7	13	-	-	384
61	Black crappie	Centrarchid sp.	17	-	6903	-	196	-	-	2	2	-	-	7120
62	Unidentified sunfish	Etheostoma asprigene	-	-	1	-	-	-	-	-	-	-	-	1
63	Mud darter	Etheostoma chlorosomum	-	-	-	-	39	-	-	-	-	-	-	39
64	Bluntnose darter	Etheostoma gracile	-	-	-	-	39	-	-	-	-	-	-	39
65	Slough darter	Etheostoma nigrum	-	-	-	-	2	-	-	-	-	-	-	2
66	Johnny darter	Percina caprodes	-	-	-	-	3	-	-	-	-	-	-	3
67	Logperch	Percina phoxocephala	-	-	-	-	3	-	-	-	-	-	-	3
68	Slenderhead darter	Percina or Etheostoma sp.	-	-	-	-	1	-	-	-	-	-	-	1
69	Unidentified darter	Stizostedion canadense	2	-	5	-	32	-	-	1	-	-	-	40
70	Sauger	Stizostedion vitreum	-	-	1	-	-	-	-	-	-	-	-	1
71	Walleye	Aplodinotus grunniens	135	-	163	-	288	-	-	5	2	16	-	609
72	Freshwater drum	Unidentified	-	-	-	-	1	-	-	-	-	-	-	1
73	Larval fish													
			=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
			5606	0	10430	0	1506	0	0	212	98	66	0	17918

Gears: D - Day electrofishing  
N - Night electrofishing  
F - Fyke netting  
X - Tandem fyke netting  
M - Mini fyke netting  
Y - Tandem mini fyke netting  
S - Seining  
HS - Small hoop netting  
HL - Large hoop netting  
G - Gill netting  
T - Trawling (4.8-m bottom trawl)

Table 5.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by day electrofishing in the open Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 5.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Chestnut lamprey	0.01 (0.01)							0.12 (0.12)		
Longnose gar	0.44 (0.44)					0.50 (0.50)				
Shortnose gar	0.01 (0.01)							0.12 (0.12)		
Goldeye	3.35 (1.71)					3.50 (1.94)		2.28 (1.03)		
Mooneye	0.10 (0.08)							0.82 (0.70)		
Gizzard shad	91.45 (38.32)					95.50 (43.03)		61.71 (49.08)		
Threadfin shad	2.44 (2.42)					2.75 (2.75)		0.13 (0.13)		
Red shiner	0.94 (0.46)					0.50 (0.50)		4.17 (1.07)		
Spotfin shiner	0.01 (0.01)							0.12 (0.12)		
Blacktail shiner	0.01 (0.01)							0.12 (0.12)		
Common carp	0.82 (0.28)					0.50 (0.29)		3.14 (1.05)		
Silver chub	1.41 (0.57)					1.50 (0.65)		0.74 (0.62)		
Emerald shiner	1.77 (0.58)					1.50 (0.65)		3.74 (0.99)		
River carpsucker	0.83 (0.42)					0.75 (0.48)		1.46 (0.44)		
Smallmouth buffalo	1.04 (0.37)					1.00 (0.41)		1.34 (0.62)		
Bigmouth buffalo	0.80 (0.43)					0.75 (0.48)		1.14 (0.58)		
Black buffalo	0.04 (0.03)							0.36 (0.25)		
Channel catfish	0.18 (0.08)							1.49 (0.71)		
Flathead catfish	0.48 (0.26)					0.50 (0.29)		0.36 (0.25)		
Western mosquitofish	0.01 (0.01)							0.13 (0.13)		
White bass	8.15 (2.30)					8.50 (2.60)		5.57 (1.78)		
Yellow bass	0.22 (0.22)					0.25 (0.25)				
Green sunfish	13.31 (12.98)					14.75 (14.75)		2.75 (1.31)		
Bluegill	1.32 (1.32)					1.50 (1.50)				
Black crappie	0.45 (0.25)					0.50 (0.29)		0.12 (0.12)		
Sauger	0.24 (0.22)					0.25 (0.25)		0.13 (0.13)		
Freshwater drum	14.41 (9.15)					14.75 (10.37)		11.90 (5.01)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 5.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by fyke netting in the open Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 5.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shortnose gar	0.53 (0.53)							0.53 (0.53)		
Goldeye	2.98 (2.68)							2.98 (2.69)		
Gizzard shad	1.20 (1.05)							1.20 (1.05)		
Common carp	0.13 (0.13)							0.13 (0.13)		
Blue catfish	0.13 (0.13)							0.13 (0.13)		
Channel catfish	0.50 (0.27)							0.50 (0.27)		
Flathead catfish	0.75 (0.30)							0.75 (0.30)		
White bass	8.61 (8.59)							8.61 (8.61)		
Green sunfish	0.12 (0.12)							0.12 (0.12)		
Bluegill	0.12 (0.12)							0.12 (0.12)		
Black crappie	0.24 (0.24)							0.24 (0.24)		
Sauger	0.13 (0.13)							0.13 (0.13)		
Freshwater drum	8.03 (4.87)							8.03 (4.88)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 5.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by mini fyke netting in the open Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 5.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Chestnut lamprey	0.12 (0.11)					0.12 (0.12)		0.06 (0.06)		
Shortnose gar	0.27 (0.24)					0.27 (0.27)		0.27 (0.18)		
Goldeye	1.28 (0.73)					1.37 (0.83)		0.61 (0.35)		
Skipjack herring	0.19 (0.12)					0.12 (0.12)		0.74 (0.45)		
Gizzard shad	6.28 (2.37)					6.63 (2.68)		3.69 (1.80)		
Central stoneroller	0.14 (0.14)					0.16 (0.16)				
Red shiner	0.63 (0.18)					0.67 (0.20)		0.34 (0.24)		
Common carp	1.35 (0.68)					1.14 (0.71)		2.82 (2.40)		
Speckled chub	0.12 (0.10)					0.12 (0.12)		0.13 (0.09)		
Silver chub	0.43 (0.25)					0.38 (0.27)		0.78 (0.49)		
Golden shiner	0.11 (0.11)					0.12 (0.12)				
Emerald shiner	2.36 (1.10)					2.48 (1.24)		1.45 (1.23)		
River shiner	0.22 (0.22)					0.25 (0.25)				
Silverband shiner	1.38 (0.58)					1.52 (0.66)		0.42 (0.28)		
Channel shiner	0.23 (0.14)					0.24 (0.16)		0.20 (0.11)		
Bullhead minnow	0.38 (0.17)					0.40 (0.20)		0.22 (0.12)		
Quillback	0.11 (0.11)					0.12 (0.12)				
Blue sucker	0.46 (0.29)					0.45 (0.32)		0.49 (0.49)		
Smallmouth buffalo	0.01 (0.01)							0.06 (0.06)		
Bigmouth buffalo	4.53 (2.77)					4.34 (3.09)		5.92 (4.51)		
Channel catfish	1.54 (0.57)					1.12 (0.55)		4.65 (2.52)		
Tadpole madtom	0.01 (0.01)							0.06 (0.06)		
Freckled madtom	0.12 (0.11)					0.12 (0.12)		0.07 (0.07)		
Flathead catfish	0.39 (0.28)					0.43 (0.32)		0.14 (0.10)		
Pirate perch	0.15 (0.14)					0.16 (0.16)		0.13 (0.09)		
Western mosquitofish	0.34 (0.32)					0.36 (0.36)		0.13 (0.09)		
Brook silverside	0.43 (0.43)					0.49 (0.49)				
White bass	1.02 (0.33)					1.08 (0.37)		0.60 (0.36)		
Green sunfish	0.23 (0.15)					0.26 (0.17)				

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



Table 5.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by mini fyke netting in the open Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 5.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Warmouth	0.02 (0.01)							0.14 (0.10)		
Orangespotted sunfish	1.45 (0.93)					1.60 (1.05)		0.31 (0.31)		
Bluegill	0.81 (0.52)					0.85 (0.59)		0.51 (0.28)		
Green x orangespotted sunfish	0.11 (0.11)					0.12 (0.12)				
Spotted bass	0.11 (0.11)					0.12 (0.12)				
Largemouth bass	0.12 (0.12)					0.14 (0.14)				
White crappie	1.49 (1.10)					1.57 (1.25)		0.90 (0.54)		
Black crappie	1.69 (1.48)					1.82 (1.68)		0.81 (0.56)		
Johnny darter	0.11 (0.11)					0.12 (0.12)				
Logperch	0.24 (0.15)					0.26 (0.17)		0.07 (0.07)		
Slenderhead darter	0.02 (0.02)							0.19 (0.19)		
Sauger	2.01 (1.28)					2.23 (1.46)		0.45 (0.26)		
Freshwater drum	6.92 (2.33)					7.45 (2.64)		3.04 (1.58)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 5.3.4. Mean catch-per-unit-effort and (standard error) for fishes collected by small hoop netting in the open Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 5.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shortnose gar	0.02 (0.02)							0.20 (0.14)		
Gizzard shad	0.11 (0.11)					0.13 (0.13)				
Common carp	0.01 (0.01)							0.12 (0.12)		
Smallmouth buffalo	0.01 (0.01)							0.07 (0.07)		
Black bullhead	0.01 (0.01)							0.06 (0.06)		
Blue catfish	0.22 (0.22)					0.25 (0.25)				
Channel catfish	1.10 (0.79)					0.26 (0.26)		7.36 (6.34)		
Flathead catfish	0.16 (0.12)					0.13 (0.13)		0.39 (0.22)		
White bass	0.35 (0.21)					0.38 (0.24)		0.13 (0.09)		
Black crappie	0.22 (0.22)					0.25 (0.25)				
Sauger	0.11 (0.11)					0.13 (0.13)				
Freshwater drum	0.33 (0.21)					0.38 (0.24)				

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 5.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by large hoop netting in the open Mississippi River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 5.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shovelnose sturgeon	0.01 (0.01)							0.06 (0.06)		
Shortnose gar	0.02 (0.02)							0.20 (0.14)		
Gizzard shad	1.38 (0.79)					1.52 (0.90)		0.39 (0.19)		
Common carp	0.01 (0.01)							0.12 (0.12)		
River carpsucker	0.58 (0.56)					0.63 (0.63)		0.18 (0.18)		
Smallmouth buffalo	0.38 (0.26)					0.23 (0.23)		1.46 (1.31)		
Blue catfish	0.01 (0.01)							0.06 (0.06)		
Channel catfish	0.04 (0.04)							0.37 (0.30)		
Flathead catfish	0.23 (0.12)					0.24 (0.14)		0.12 (0.12)		
White bass	0.11 (0.11)					0.13 (0.13)				
Freshwater drum	0.12 (0.11)					0.13 (0.13)		0.07 (0.07)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 5.4.1. Mean catch-per-unit-effort and (standard error) for fishes collected by day electrofishing in the open Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Chestnut lamprey								0.33 (0.33)	
Longnose gar					1.25 (1.25)				
Goldeye					6.50 (3.50)				
Skipjack herring					0.63 (0.63)				
Gizzard shad					326.63 (275.38)			1113.33 (834.45)	
Threadfin shad					2.00 (2.00)			2.67 (2.19)	
Blacktail shiner								0.33 (0.33)	
Common carp					1.13 (0.13)			5.00 (1.53)	
Silver chub					3.00 (2.00)				
Emerald shiner					1.88 (1.88)			2.00 (1.53)	
Bullhead minnow								0.33 (0.33)	
Quillback								1.00 (1.00)	
Smallmouth buffalo					1.25 (1.25)			5.33 (5.33)	
Bigmouth buffalo					0.63 (0.63)			1.67 (1.20)	
Black buffalo					1.13 (0.13)			0.67 (0.67)	
Flathead catfish								0.33 (0.33)	
Pirate perch								0.33 (0.33)	
Brook silverside								1.67 (0.88)	
White bass					2.13 (0.88)			53.67 (31.71)	
Green sunfish					2.50 (2.50)			2.67 (2.67)	
Orangespotted sunfish					0.63 (0.63)			4.00 (2.00)	
Bluegill								9.33 (4.26)	
Spotted bass								1.00 (0.58)	
Largemouth bass								5.33 (3.18)	
White crappie								33.33 (23.14)	
Black crappie					1.00 (1.00)			4.00 (2.08)	
Freshwater drum					0.50 (0.50)			0.33 (0.33)	

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 5.4.2. Mean catch-per-unit-effort and (standard error) for fishes collected by fyke netting in the open Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Spotted gar					0.51 (0.51)				
Shortnose gar								0.16 (0.16)	
Bowfin					0.51 (0.51)				
Goldeye					2.55 (2.55)				
American eel					1.08 (1.08)			0.77 (0.49)	
Gizzard shad					632.65 (632.65)			0.51 (0.35)	
Threadfin shad								0.16 (0.16)	
Common carp					8.25 (5.02)			2.13 (0.99)	
River carpsucker					1.05 (0.03)			1.95 (1.50)	
Quillback					0.51 (0.51)			1.36 (1.02)	
Smallmouth buffalo					20.92 (20.92)			3.34 (3.15)	
Bigmouth buffalo					6.12 (6.12)				
Shorthead redhorse								0.16 (0.16)	
Black bullhead					20.92 (20.92)			3.00 (3.00)	
Blue catfish					0.51 (0.51)				
Channel catfish								3.48 (2.20)	
Flathead catfish					0.54 (0.54)			0.83 (0.63)	
White bass					34.69 (34.69)			195.68 (193.44)	
Yellow bass					2.04 (2.04)			14.19 (13.19)	
Green sunfish					19.90 (19.90)				
Orangespotted sunfish								2.55 (2.35)	
Bluegill					30.61 (30.61)			1.27 (1.27)	
Redear sunfish					2.04 (2.04)				
Largemouth bass					9.69 (9.69)				
White crappie					62.24 (62.24)			16.54 (11.59)	
Black crappie					3504.59 (3504.59)			5.14 (3.32)	
Sauger					1.53 (1.53)			0.16 (0.16)	
Walleye					0.51 (0.51)				
Freshwater drum					21.57 (16.19)			9.43 (3.50)	

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, offshore. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 5.4.3. Mean catch-per-unit-effort and (standard error) for fishes collected by mini fyke netting in the open Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar								0.16 (0.16)	
American eel					0.35 (0.35)				
Gizzard shad					1.78 (0.35)			1.15 (0.79)	
Common carp								0.19 (0.19)	
Silverband shiner					0.35 (0.35)			0.18 (0.18)	
Channel shiner					0.35 (0.35)			0.31 (0.31)	
Pugnose minnow								0.16 (0.16)	
Bullhead minnow					0.35 (0.35)			1.60 (1.60)	
Bigmouth buffalo								1.24 (1.24)	
Black bullhead					0.35 (0.35)				
Blue catfish					1.42 (1.42)				
Channel catfish					2.84 (1.87)			2.04 (1.82)	
Freckled madtom					0.35 (0.35)				
Flathead catfish								0.19 (0.19)	
Pirate perch								0.21 (0.21)	
Blackstripe topminnow								0.93 (0.93)	
Western mosquitofish								3.27 (3.27)	
White bass					2.86 (1.90)			2.95 (2.53)	
Yellow bass								0.16 (0.16)	
Flier					0.36 (0.36)				
Green sunfish					1.77 (1.77)			1.48 (1.48)	
Warmouth								0.63 (0.63)	
Orangespotted sunfish					0.35 (0.35)			0.53 (0.37)	
Bluegill					1.07 (0.61)			2.93 (1.46)	
Spotted bass								0.21 (0.21)	
White crappie					4.26 (3.25)			0.42 (0.42)	
Black crappie					59.93 (59.40)			0.16 (0.16)	
Mud darter								6.18 (5.69)	
Bluntnose darter								6.24 (5.14)	
Slough darter								0.31 (0.31)	

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 5.4.3. Mean catch-per-unit-effort and (standard error) for fishes collected by mini fyke netting in the open Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 2

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Johnny darter								0.16 (0.16)	
Sauger					2.84 (1.88)			0.18 (0.18)	
Freshwater drum					59.28 (23.91)			3.39 (2.74)	

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 5.4.4. Mean catch-per-unit-effort and (standard error) for fishes collected by small hoop netting in the open Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Common carp								0.24 (0.24)	
Smallmouth buffalo								1.19 (1.19)	
White bass								10.48 (10.48)	
White crappie								1.67 (1.67)	
Freshwater drum								0.25 (0.25)	

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



Table 5.4.5. Mean catch-per-unit-effort and (standard error) for fishes collected by large hoop netting in the open Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Gizzard shad								0.48 (0.48)	
Common carp								0.95 (0.95)	
Smallmouth buffalo								0.24 (0.24)	
Bigmouth buffalo								0.24 (0.24)	
Channel catfish								0.24 (0.24)	
White crappie								3.10 (3.10)	
Black crappie								0.48 (0.48)	

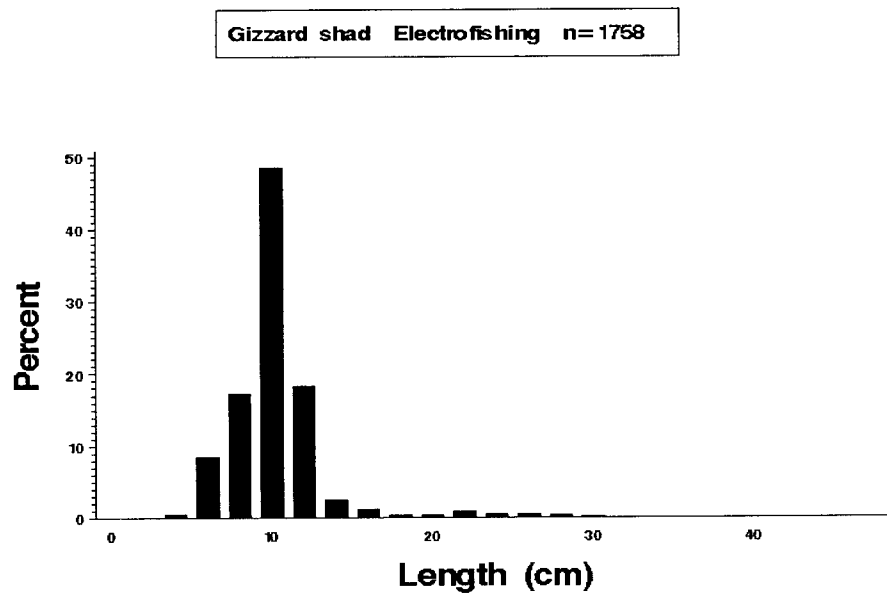
Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 5.4.6. Mean catch-per-unit-effort and (standard error) for fishes collected by gill netting in the open Mississippi River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

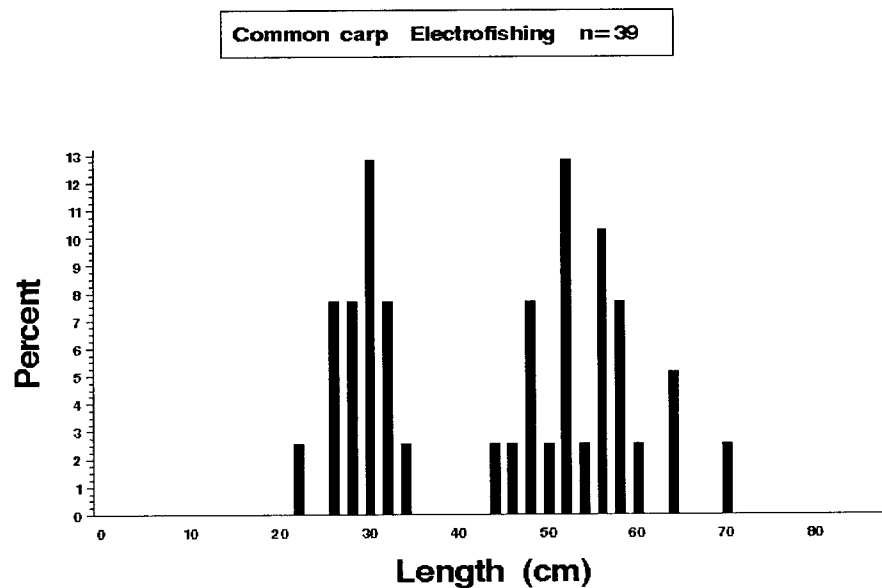
Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Chestnut lamprey								0.67 (0.67)	
Gizzard shad								2.89 (1.56)	
Common carp								4.33 (1.00)	
River carpsucker								1.78 (0.44)	
Quillback								0.56 (0.56)	
Smallmouth buffalo								0.56 (0.56)	
Shorthead redhorse								0.56 (0.56)	
Blue catfish								2.00 (2.00)	
Channel catfish								2.22 (2.22)	
White bass								0.67 (0.67)	
Yellow bass								0.67 (0.67)	
Striped bass								0.56 (0.56)	
Freshwater drum								5.11 (2.89)	

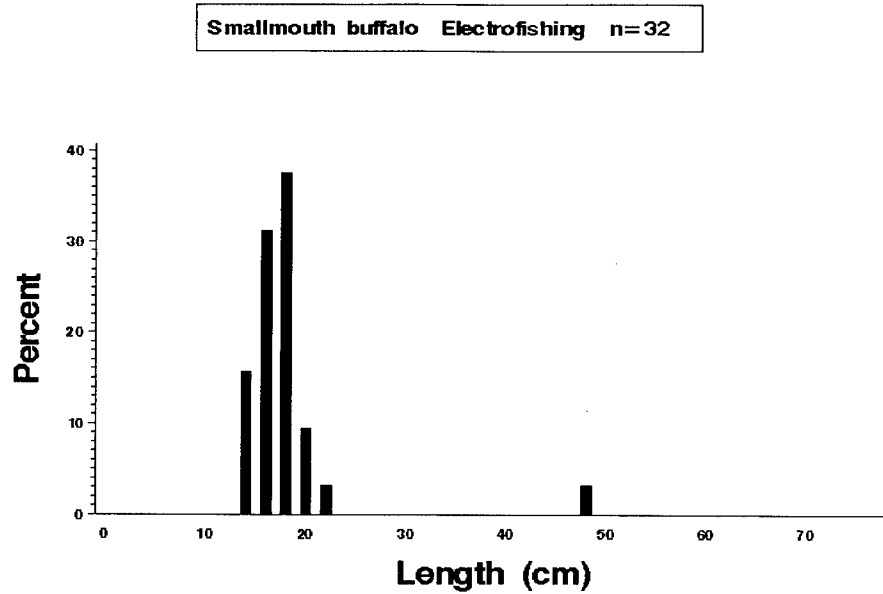
Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



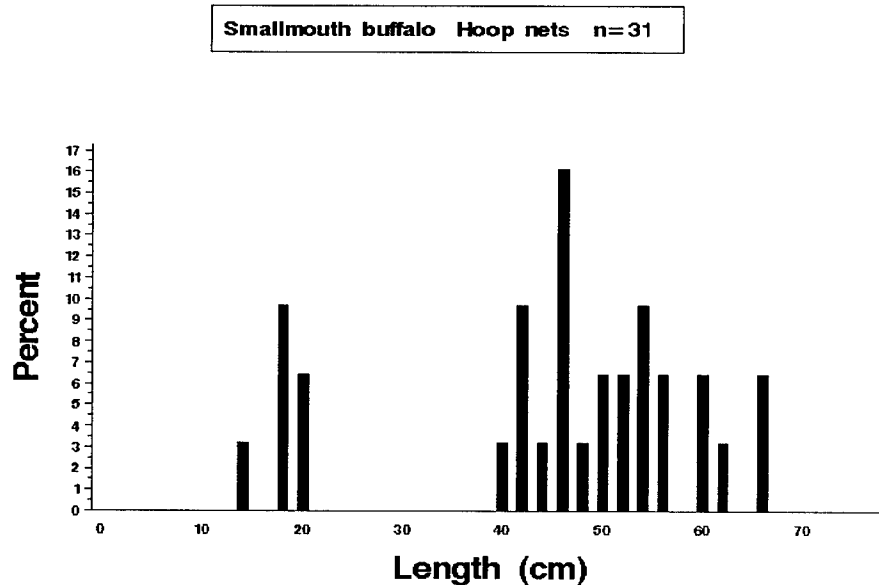
**Figure 5.2.** Length distributions (*length*) as a percentage of catch (*percent*) for gizzard shad (*Dorosoma cepedianum*) collected by electrofishing in the Upper Mississippi River Open Reach during 1993.



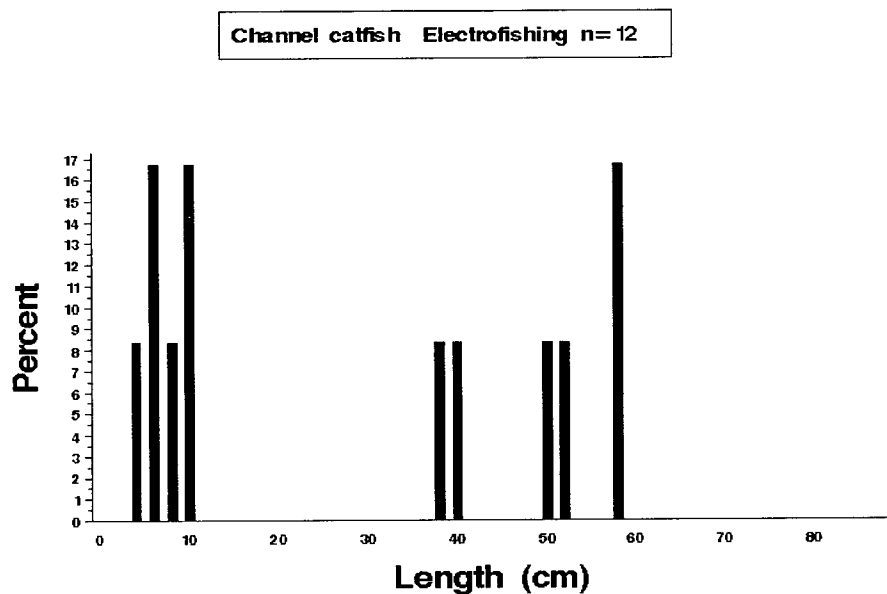
**Figure 5.3.** Length distributions (*length*) as a percentage of catch (*percent*) for common carp (*Cyprinus carpio*) collected by electrofishing in the Upper Mississippi River Open Reach during 1993.



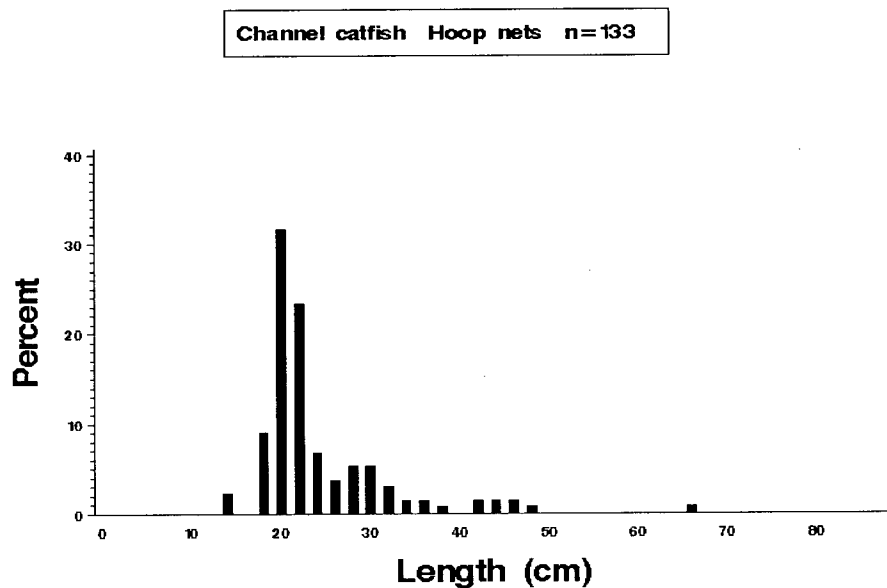
**Figure 5.4.** Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by electrofishing in the Upper Mississippi River Open Reach during 1993.



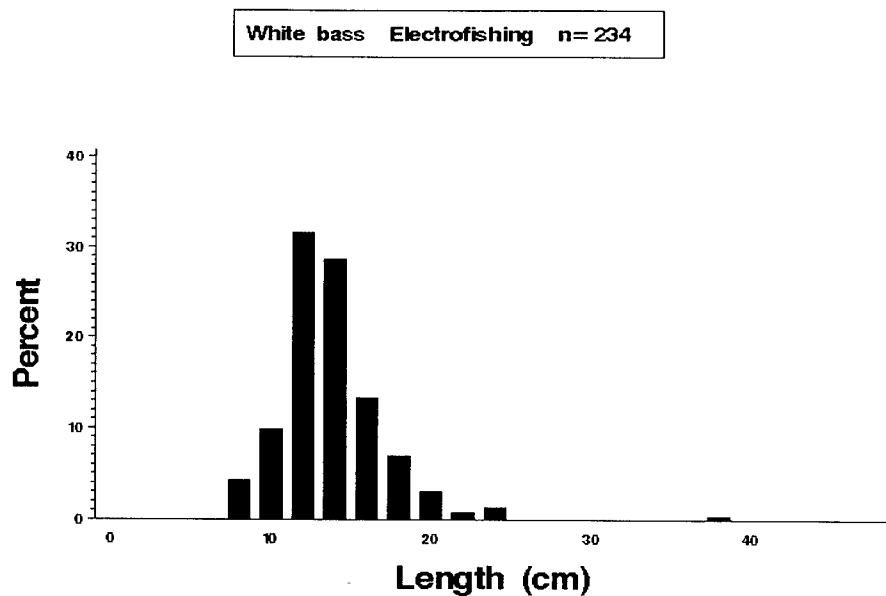
**Figure 5.5.** Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by large and small hoop netting in the Upper Mississippi River Open Reach during 1993.



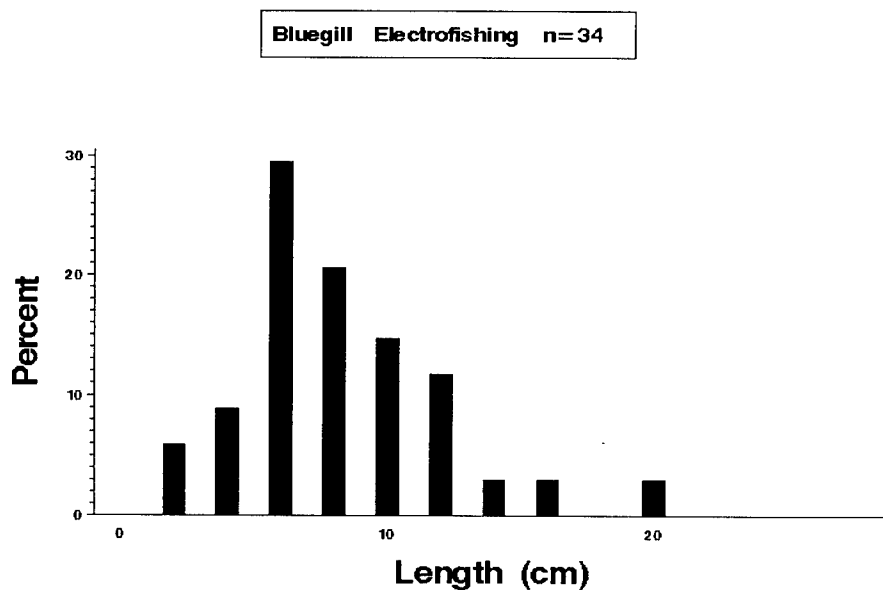
**Figure 5.6.** Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by electrofishing in the Upper Mississippi River Open Reach during 1993.



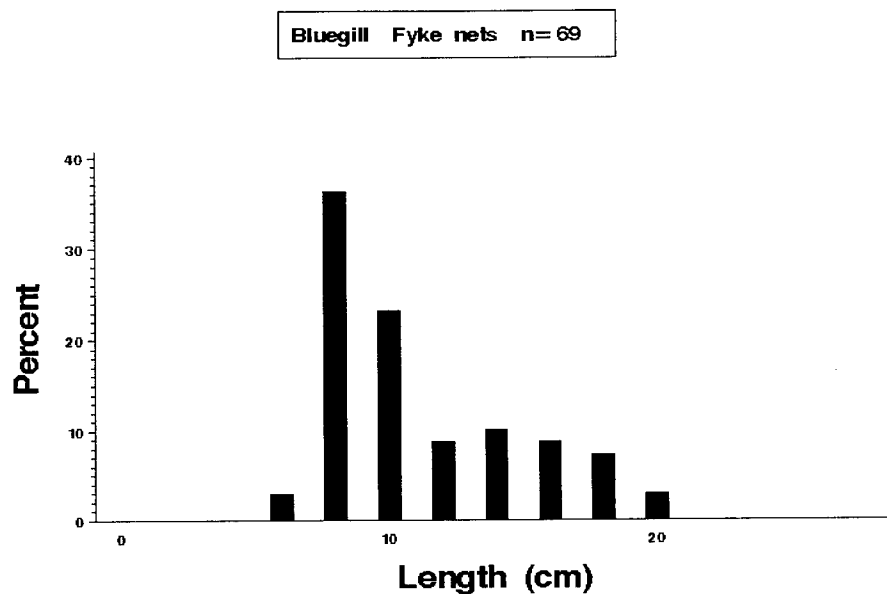
**Figure 5.7.** Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by large and small hoop netting in the Upper Mississippi River Open Reach during 1993.



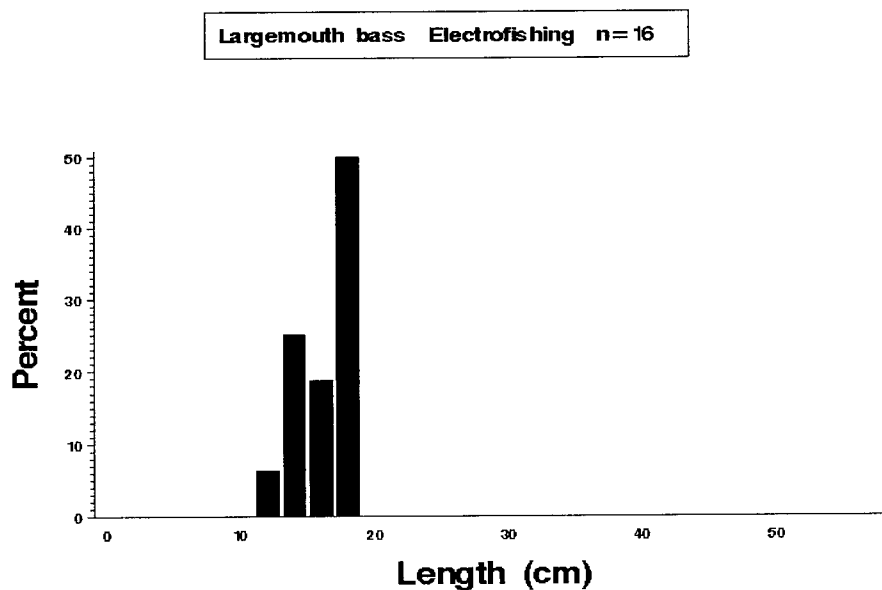
**Figure 5.8.** Length distributions (*length*) as a percentage of catch (*percent*) for white bass (*Morone chrysops*) collected by electrofishing in the Upper Mississippi River Open Reach during 1993.



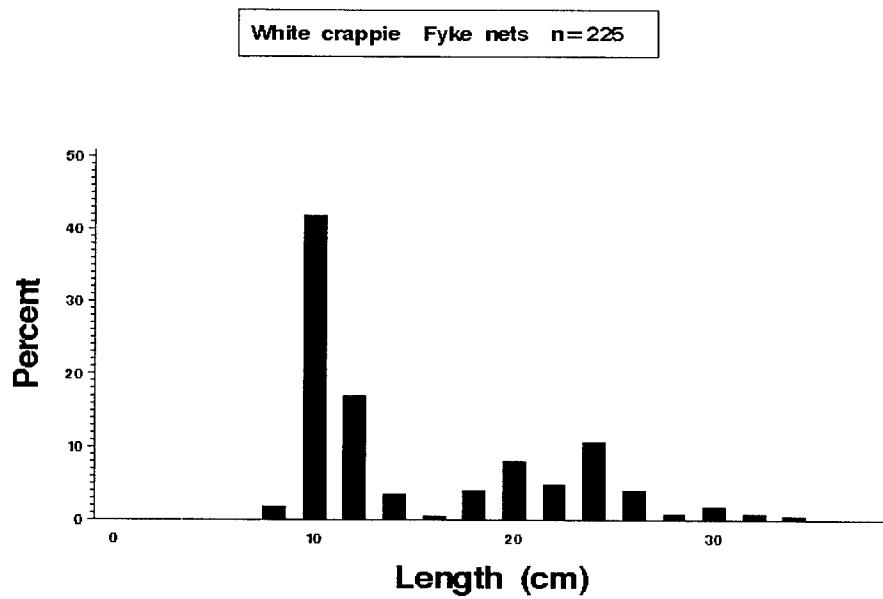
**Figure 5.9.** Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by electrofishing in the Upper Mississippi River Open Reach during 1993.



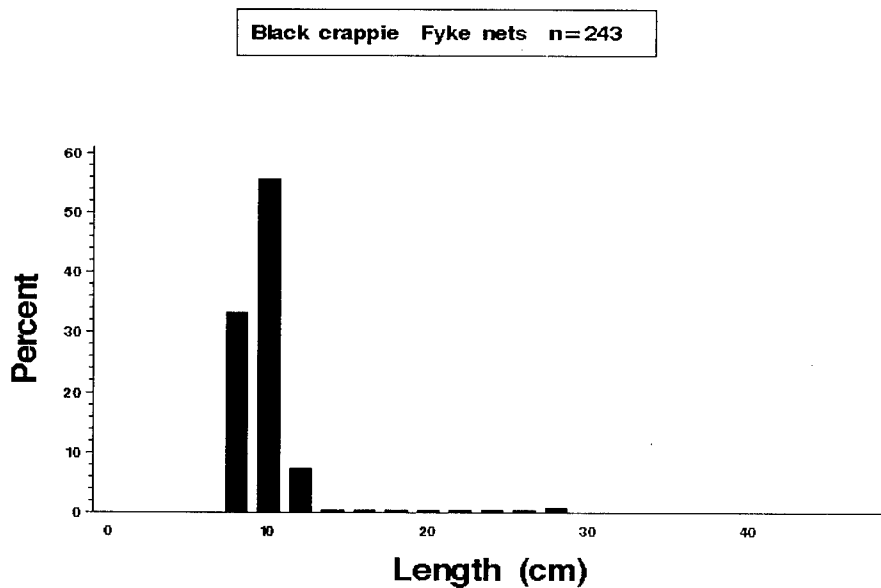
**Figure 5.10.** Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by fyke netting in the Upper Mississippi River Open Reach during 1993.



**Figure 5.11.** Length distributions (*length*) as a percentage of catch (*percent*) for largemouth bass (*Micropterus salmoides*) collected by electrofishing in Upper Mississippi River Open Reach during 1993.

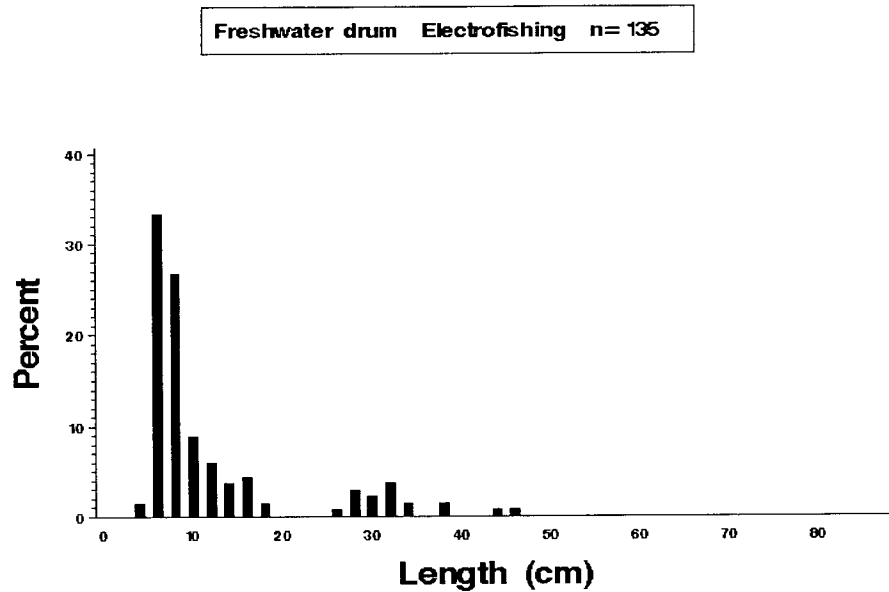


**Figure 5.12.** Length distributions (*length*) as a percentage of catch (*percent*) for white crappie (*Pomoxis annularis*) collected by fyke netting in the Upper Mississippi River Open Reach during 1993.

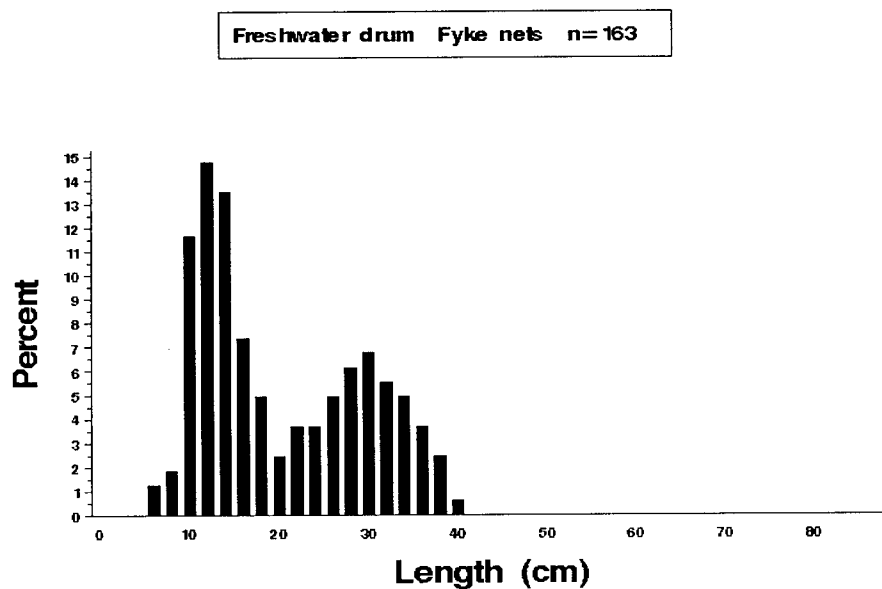


**Figure 5.13.** Length distributions (*length*) as a percentage of catch (*percent*) for black crappie (*Pomoxis nigromaculatus*) collected by fyke netting in the Upper Mississippi River Open Reach during 1993.





**Figure 5.14.** Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by electrofishing in the Upper Mississippi River Open Reach during 1993.



**Figure 5.15.** Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by fyke netting in the Upper Mississippi River Open Reach during 1993.

## **Chapter 6. La Grange Pool, Illinois**

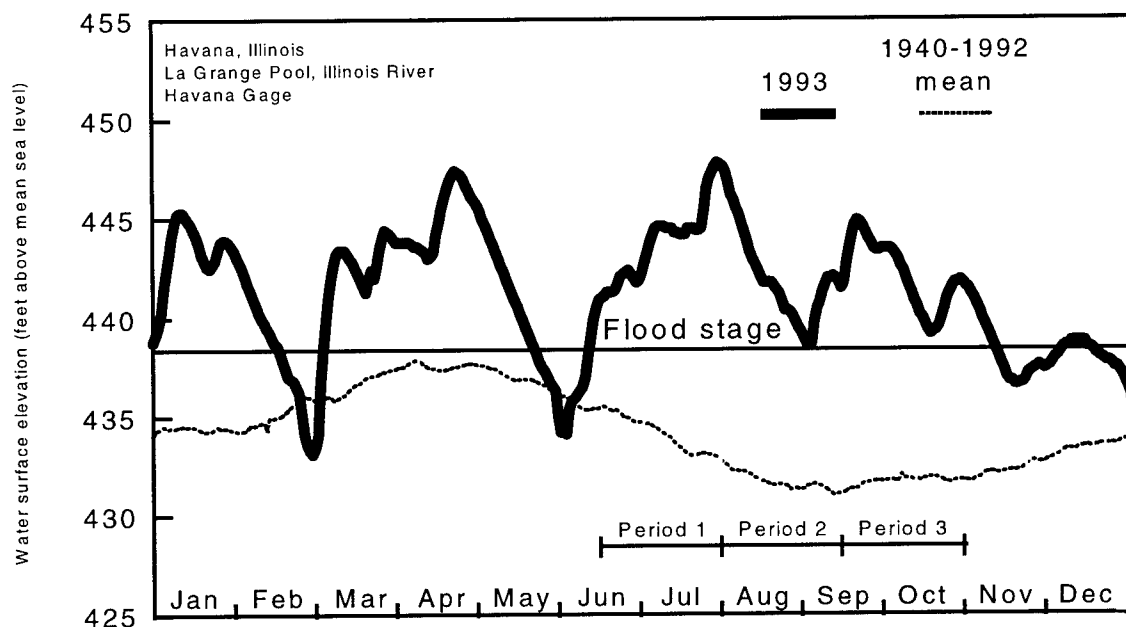
by

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## Hydrograph

River levels were above average during 1993 except for brief periods at the end of February and May (Figure 6.1). River levels were above flood stage 285 days in 1993; mean water surface elevations suggest that the river was above flood stage for an average of 71 days from 1940 to 1992. The U.S. Army Corps of Engineers discharge data were obtained from the Environmental Management Technical Center (Wlosinski et al. 1995).



**Figure 6.1.** Daily water surface elevation from Havana Gage for La Grange Pool, Illinois River, during 1993 and mean elevation since 1940. The U.S. Army Corps of Engineers discharge data were obtained from the Environmental Management Technical Center (Wlosinski et al. 1995).

## Summary of Sampling Effort

We made 451 collections in 1993—137 in period 1, 154 in period 2, and 160 in period 3 (Table 6.1). Of those, 385 were from randomly selected sites in the BWCS, BWCO, SCB, and MCBU strata. Of the 66 collections from fixed sites, 33 were from the Peoria TWZ fixed site and 33 were from the Bath Chute SCB fixed site.

## Total Catch by Gear

Historical records indicate 115 fish species and three hybrid crosses have been collected from the La Grange Pool since the late 1800s (Smith 1979). In 1993, we collected 28,907 fish representing 64 species and three hybrid crosses (Table 6.2). Seven species and one hybrid cross were new records for LTRMP sampling in the La Grange Pool (goldeye, central stoneroller, creek chub, grass pickerel, pirate perch, mud darter, slenderhead

darter, and striped bass × white bass hybrid). The five most numerically abundant species were gizzard shad (9,530), emerald shiner (5,749), white bass (4,668), freshwater drum (1,510), and bluegill (907). Total species collected, excluding hybrids, by gear type were 40 by day electrofishing, 36 by night electrofishing, 29 by fyke netting, 22 by tandem fyke netting, 49 by mini fyke netting, 23 by tandem mini fyke netting, 40 by seining, 15 by small hoop nets, 18 by large hoop netting, 18 by gill netting, and 10 by trawling. Gill nets were an experimental gear and only one species (paddlefish) and one hybrid (striped bass × white bass) caught in gill nets were not caught in other gears. Our combined catch for 1990 through 1993 consisted of 124,171 fish representing 72 species and four hybrid crosses.

## **Random Sampling, Mean *C/f* by Gear and Stratum**

### *Day Electrofishing*

For day electrofishing (Table 6.3.1), gizzard shad had the highest poolwide mean catch-per-unit-effort (*C/f*) of 107.34, followed by emerald shiner (11.50) and white bass (5.15). Gizzard shad also had the highest *C/f* in the BWCS (59.83), MCBU (129.83), and SCB (32.17) strata. Emerald shiner had the second highest *C/f* in the BWCS (2.89), MCBU (13.94), and SCB (22.78) strata, and the third highest *C/f* by stratum were common carp in the BWCS (2.67) and white bass in the MCBU (6.17) and SCB (6.56).

### *Night Electrofishing*

For night electrofishing (Table 6.3.2), gizzard shad had the highest poolwide mean *C/f* of 28.52, followed by freshwater drum (9.64) and white bass (5.32). Gizzard shad also had the highest *C/f* in the BWCS (69.40) and SCB (58.90) strata, and freshwater drum had the highest *C/f* (12.60) in the MCBU stratum. In the BWCS stratum, emerald shiner had the second highest *C/f* (5.20), followed by brook silverside (2.60). In the SCB stratum, freshwater drum had the second highest *C/f* (12.60), followed by white bass (2.90).

### *Fyke Net*

Poolwide mean *C/f* for fyke netting (Table 6.3.3), based solely on BWCS collections, was highest for white bass (57.78), followed by bluegill (10.68) and freshwater drum (7.75).

### *Tandem Fyke Net*

Poolwide mean *C/f* for tandem fyke netting (Table 6.3.4), based solely on BWCO collections, was highest for gizzard shad (9.35), followed by freshwater drum (5.46) and white bass (3.14).

### *Mini Fyke Net*

For mini fyke nets (Table 6.3.5), white bass had the highest poolwide mean *C/f* (48.67), followed by emerald shiner (5.78) and bluegill (5.59). Bluegill had the highest *C/f* in the BWCS stratum (1.61), followed by black crappie (1.55) and black bullhead (1.50). White bass had the highest *C/f* in the MCBU stratum (68.89), followed by bluegill (6.94) and sauger (2.76). In the SCB stratum, emerald shiner had the highest *C/f* (123.49), followed by channel catfish (13.95) and freshwater drum (9.54).

### *Tandem Mini Fyke Net*

Poolwide mean *C/f* for tandem mini fyke netting (Table 6.3.6), based solely on BWCO collections, was highest for channel catfish (6.42), followed by freshwater drum (6.38) and white bass (1.07).

### *Small Hoop Net*

For small hoop nets (Table 6.3.7), common carp had the highest poolwide mean *C/f* (1.60), followed by channel catfish (0.91) and bluegill (0.54). In the BWCO stratum, common carp had the highest *C/f* (1.29), followed by channel catfish (0.64) and bluegill and black bullhead (0.21). Common carp had the highest *C/f* in the MCBU (1.79) and SCB (1.98) strata, followed by channel catfish (1.12) and bluegill (0.78) in the MCBU stratum, and brown bullhead (1.78) and channel catfish (0.61) in the SCB stratum.

### *Large Hoop Net*

For large hoop nets (Table 6.3.8), smallmouth buffalo had the highest poolwide mean *C/f* (3.63), followed by common carp (2.95) and river carpsucker (0.80). In the BWCO stratum, smallmouth buffalo had the highest *C/f* (5.14), followed by common carp (3.02) and river carpsucker and gizzard shad (0.54). Common carp had the highest *C/f* in both MCBU (2.74) and SCB (5.58) strata, followed by smallmouth buffalo (MCBU, 2.71; SCB, 1.30). White bass had the third highest *C/f* (1.22) in the MCBU stratum, whereas channel catfish was the third highest (0.68) in the SCB stratum.

### *Seine*

Gizzard shad had the highest poolwide mean *C/f* (60.30) for seining (Table 6.3.9), followed by emerald shiner (16.08) and white bass (13.50). Gizzard shad had the highest *C/f* in the BWCS stratum (84.20), followed by emerald shiner (45.35) and white bass (43.90). Gizzard shad also had the highest *C/f* in the MCBU stratum (54.46), followed by smallmouth buffalo (12.04) and emerald shiner (5.67). In the SCB stratum, western mosquitofish had the highest *C/f* (38.50), followed by bullhead minnow (17.13) and gizzard shad (14.44).

### *Gill Net*

Common carp had the highest poolwide mean *C/f* (2.52) for gill netting (Table 6.3.10), followed by freshwater drum (0.72) and gizzard shad (0.67). Common carp had the highest *C/f* in the BWCO (4.12), followed by freshwater drum (0.67) and smallmouth buffalo (0.42). Common carp had the highest *C/f* in the BWCS (2.58), followed by gizzard shad (1.91) and freshwater drum (1.42). Common carp had the highest *C/f* in the MCBU (1.39), followed by smallmouth buffalo (0.52) and freshwater drum (0.51). And in the SCB stratum, common carp also had the highest *C/f* (1.95), followed by freshwater drum (0.38) and river carpsucker and smallmouth buffalo (0.37).

## **Fixed Sampling, Mean *C/f* by Gear and Stratum**

### ***Day Electrofishing***

Gizzard shad had the highest mean *C/f* (31.33) for day electrofishing (Table 6.4.1) at the SCB stratum, followed by emerald shiner (14.67) and white bass (3.33). At the TWZ stratum, emerald shiner had the highest *C/f* (21.63), followed by gizzard shad (21.46) and common carp (14.71).

### ***Night Electrofishing***

For night electrofishing at the SCB stratum (Table 6.4.2), freshwater drum had the highest *C/f* (22.00), followed by white bass (5.83) and gizzard shad (4.17). Freshwater drum had the highest *C/f* (31.00) at the TWZ stratum, followed by gizzard shad (22.50) and white bass (17.17).

### ***Fyke Net***

White bass had the highest *C/f* (48.30) in TWZ fyke nets (Table 6.4.3), followed by bluegill (9.78) and freshwater drum (2.60).

### ***Mini Fyke Net***

For mini fyke netting at the SCB stratum (Table 6.4.4), emerald shiner had the highest *C/f* (48.47), followed by bluegill (20.48) and white bass (12.42). At the TWZ stratum, emerald shiner had the highest *C/f* (180.58), followed by white bass (35.62) and bluegill (7.80).

### ***Small Hoop Net***

Common carp had the highest *C/f* (4.07) for small hoop nets at the SCB stratum (Table 6.4.5), followed by channel catfish (0.70) and freshwater drum (0.08).

### ***Large Hoop Net***

Common carp had the highest *C/f* (1.13) for large hoop nets at the SCB stratum (Table 6.4.6), followed by channel catfish (0.34) and freshwater drum (0.26).

### ***Trawl***

Channel catfish (4.50) had the highest *C/f* in TWZ trawls (Table 6.4.7), followed by freshwater drum (0.50) and silver chub (0.20).

## Length Distributions of Selected Species

### *Gizzard Shad*

A total of 5,666 gizzard shad were collected in 1993 from day and night electrofishing combined (Figure 6.2). Gizzard shad from 10 to 12 cm dominated the catch, with a small peak from 2 to 8 cm.

### *Common Carp*

The length distribution from 426 common carp collected by electrofishing (Figure 6.3) indicated abundant fish from 34 to 52 cm, with relatively few fish outside this range. Some fish less than 10 cm were present, as were some greater than 52 cm.

### *Smallmouth Buffalo*

Of the 170 smallmouth buffalo we collected by electrofishing in 1993 (Figure 6.4), two peaks in length—near 12 and 32 cm—were evident. Smallmouth buffalo from electrofishing ranged in length from 4 to 48 cm.

Hoop net length distributions of 275 smallmouth buffalo showed a peak at 36 cm (Figure 6.5). Hoop nets did not take smaller fish collected by electrofishing. Smallmouth buffalo collected in hoop nets ranged from 12 to 52 cm.

### *Channel Catfish*

The electrofishing length distribution represents only 34 channel catfish. More than 23% of these fish were 10 cm or smaller (Figure 6.6). Electrofishing collected fish ranging from 4 to 60 cm.

Channel catfish from hoop nets ranged in length from 8 to 64 cm (Figure 6.7). From the 147 channel catfish, two peaks were evident, one at 18 cm and the second between 34 and 36 cm.

### *Northern Pike*

No northern pike were collected from the La Grange Pool by electrofishing during LTRMP sampling in 1993 (Table 6.2). Therefore, no length distributions were included for this report. However, two northern pike were collected in mini fyke nets; they were 22 and 36 cm long.

### *White Bass*

We caught 604 white bass during electrofishing in 1993 (Figure 6.8). Fish were almost normally distributed from 4 to 20 cm, the larger peak being at 10 cm, with a smaller peak at 30 cm.

### *Bluegill*

We caught 96 bluegill during electrofishing in 1993 (Figure 6.9). The bluegill ranged in length from 2 to 20 cm with two peaks, one at 4 cm and the second one at 14 cm.

We combined catches from fyke and tandem fyke net sets for a length distribution of 272 bluegill (Figure 6.10). These fish ranged from 4 to 20 cm, with a peak at 10 cm.

### *Largemouth Bass*

The electrofishing length distribution from 108 largemouth bass (Figure 6.11) indicated fish were distributed from 4 to 42 cm, with a peak at 10 cm.

### *White Crappie*

During 1993, we collected 17 white crappie from fyke and tandem fyke nets ranging from 8 to 26 cm (Figure 6.12).

### *Black Crappie*

We caught 55 black crappie in fyke and tandem fyke nets in 1993, ranging from 6 to 26 cm (Figure 6.13).

### *Sauger*

We caught 88 sauger during electrofishing in 1993 (Figure 6.14). Fish lengths ranged from 10 to 48 cm, with a peak between 14 and 20 cm.

### *Walleye*

We caught seven walleye during electrofishing in 1993. Their lengths ranged from 10 to 26 cm. Because of the small sample size, length distributions were not included in this report.

### *Freshwater Drum*

We caught 690 freshwater drum by electrofishing in 1993 (Figure 6.15). Fish lengths were distributed from 4 to 46 cm, with peaks at 12 and 24 cm.

We caught 281 freshwater drum in fyke and tandem fyke nets (Figure 6.16). These fish were distributed from 8 to 36 cm, with peaks at 12 and 24 cm.



Table 6.1. Allocation of fish sampling effort among strata by the Long Term Resource Monitoring Program in the La Grange Pool of the Illinois River during 1993. Table entries are numbers of successfully completed standardized monitoring collections. Table page: 1

Sampling period = 1: June 15 - July 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	TRI	TWZ	TOTAL
Day electrofishing	6		8	6					2	22
Fyke net	6								2	8
Gill net	6	4	4	4						18
Large hoop net		4	8	6						18
Small hoop net		4	8	5						17
Mini fyke net	6		8	5					2	21
Night electrofishing	2		4	2					2	10
Seine	4			8						12
Trawling									4	4
Tandem fyke net		4								4
Tandem mini fyke net		3								3
	----	----	----	----	----	----	----	----	----	----
SUBTOTAL	30	19	40	36	0	0	0	0	12	137

Sampling period = 2: August 1 - September 14

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	TRI	TWZ	TOTAL
Day electrofishing	6		8	6					2	22
Fyke net	6								2	8
Gill net	6	4	4	4						18
Large hoop net		4	8	6						18
Small hoop net		4	8	7						19
Mini fyke net	6		8	6					2	22
Night electrofishing	2		4	2					2	10
Seine	8		8	8						24
Trawling									4	4
Tandem fyke net		4								4
Tandem mini fyke net		5								5
	----	----	----	----	----	----	----	----	----	----
SUBTOTAL	34	21	48	39	0	0	0	0	12	154

Sampling period = 3: September 15 - October 31

Sampling gear	BWCS	BWCO	SCB	MCBU	MCBW	IMPS	IMPO	TRI	TWZ	TOTAL
Day electrofishing	6		8	6					2	22
Fyke net	6								1	7
Gill net	6	4	3	4						17
Large hoop net		4	8	6						18
Small hoop net		4	8	6						18
Mini fyke net	6		8	6					2	22
Night electrofishing	6		8	6					2	22
Seine	8		8	8						24
Trawling									2	2
Tandem fyke net		4								4
Tandem mini fyke net		4								4
	----	----	----	----	----	----	----	----	----	----
SUBTOTAL	38	20	51	42	0	0	0	0	9	160
	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
	102	60	139	117	0	0	0	0	33	451

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1993 in the La Grange Pool of the Illinois River. See Table 6.1 for the list of sampling gears actually deployed in this study reach.

Table page: 1

Species	Common name	Scientific name	D	N	F	X	M	Y	S	HS	HL	G	T	TOTAL
1	Paddlefish	Polyodon spathula	-	-	-	-	-	-	-	-	-	1	-	1
2	Spotted gar	Lepisosteus oculatus	1	-	2	-	4	-	-	-	-	-	-	7
3	Longnose gar	Lepisosteus osseus	5	8	-	-	1	-	1	-	-	1	-	16
4	Shortnose gar	Lepisosteus platostomus	18	11	20	3	17	2	-	1	3	12	-	87
5	Bowfin	Amia calva	-	-	-	-	1	-	-	-	-	-	-	1
6	Goldeye	Hiodon alosoides	-	2	-	-	-	-	-	-	-	3	-	5
7	Skipjack herring	Alosa chrysochloris	79	15	3	-	3	1	12	-	-	5	-	118
8	Gizzard shad	Dorosoma cepedianum	4325	1557	53	229	64	11	3222	-	26	43	-	9530
9	Threadfin shad	Dorosoma petenense	188	24	12	3	38	6	21	-	-	-	-	292
10	Central stoneroller	Camptostoma anomalum	-	-	-	-	-	-	15	-	-	-	-	15
11	Goldfish	Carassius auratus	4	1	-	-	-	1	6	-	-	-	-	12
12	Red shiner	Cyprinella lutrensis	13	3	-	-	9	-	49	-	-	-	-	74
13	Common carp	Cyprinus carpio	279	147	24	8	29	4	11	210	373	132	-	1217
14	Goldfish x carp	Carassius auratus x C. carpio	-	-	1	-	-	-	-	-	-	-	-	1
15	Silver chub	Macrhybopsis storeriana	1	2	-	-	11	6	110	1	-	-	2	133
16	Golden shiner	Notemigonus crysoleucas	3	1	-	-	14	-	150	-	-	-	-	168
17	Emerald shiner	Notropis atherinoides	936	81	-	-	3535	-	1197	-	-	-	-	5749
18	Spottail shiner	Notropis hudsonius	-	-	-	-	10	-	57	-	-	-	-	67
19	Silverband shiner	Notropis shumardi	-	-	-	-	5	-	7	-	-	-	-	12
20	Sand shiner	Notropis stramineus	-	-	-	-	-	-	92	-	-	-	-	92
21	Suckermouth minnow	Phenacobius mirabilis	-	-	-	-	-	-	1	-	-	-	-	1
22	Bluntnose minnow	Pimephales notatus	2	-	-	-	1	-	14	-	-	-	-	17
23	Fathead minnow	Pimephales promelas	-	-	-	-	-	-	1	-	-	-	-	1
24	Bullhead minnow	Pimephales vigilax	1	1	-	-	4	-	310	-	-	-	-	316
25	Creek chub	Semotilus atromaculatus	-	-	-	-	2	-	12	-	-	-	-	14
26	River carpsucker	Carpiodes carpio	5	14	20	3	2	-	23	-	58	12	-	137
27	Quillback	Carpiodes cyprinus	-	-	-	1	-	-	1	-	2	1	-	5
28	Highfin carpsucker	Carpiodes velifer	1	1	-	-	-	-	1	-	-	-	-	3
29	White sucker	Catostomus commersoni	-	-	-	-	-	-	1	-	-	-	-	1
30	Smallmouth buffalo	Actinopterus bubalus	80	90	9	2	36	1	355	11	264	20	-	868
31	Bigmouth buffalo	Actinopterus cyprinellus	30	10	-	-	8	-	40	-	-	1	-	89
32	Black buffalo	Actinopterus niger	4	3	1	1	-	-	-	-	5	-	-	14
33	Silver redbreast	Moxostoma anisurum	-	-	-	-	-	-	1	-	-	-	-	1
34	Golden redbreast	Moxostoma erythrum	-	1	-	-	1	-	-	-	-	-	-	2
35	Shorthead redbreast	Moxostoma macrolepidotum	4	3	6	-	3	-	-	-	-	16	-	32
36	Unidentified sucker	Catostomid sp.	-	-	-	-	7	-	-	-	-	-	-	7
37	Black bullhead	Ameiurus melas	-	-	4	8	54	16	-	8	3	-	-	93
38	Yellow bullhead	Ameiurus natalis	1	1	7	5	46	5	-	-	1	-	-	66
39	Brown bullhead	Ameiurus nebulosus	2	1	15	2	3	1	-	66	26	-	-	116

Gears: D - Day electrofishing  
N - Night electrofishing  
F - Fyke netting  
X - Tandem fyke netting  
M - Mini fyke netting  
Y - Tandem mini fyke netting  
S - Seining  
HS - Small hoop netting  
HL - Large hoop netting  
G - Gill netting  
T - Trawling (4.8-m bottom trawl)

Table 6.2. Total catches, by gear type, of fishes collected by the Long Term Resource Program during 1993 in the La Grange Pool of the Illinois River. See Table 6.1 for the list of sampling gears actually deployed in this study reach.

Species	Common name	Scientific name	D	N	F	X	M	Y	S	HS	HL	G	T	TOTAL
40	Channel catfish	Ictalurus punctatus	13	21	3	4	316	151	2	84	63	7	45	709
41	Tadpole madtom	Noturus gyrinus	-	-	-	-	5	1	-	-	-	-	-	6
42	Flathead catfish	Pylodictis olivaris	4	11	1	2	4	1	-	1	5	-	-	29
43	Grass pickerel	Esox americanus vermiculatus	1	-	-	-	2	-	-	-	-	-	-	3
44	Northern pike	Esox lucius	-	-	-	-	2	-	-	-	-	-	-	2
45	Pirate perch	Aphredoderus sayanus	-	1	-	-	-	-	-	-	-	-	-	1
46	Blackstripe topminnow	Fundulus notatus	3	1	-	-	1	-	66	-	-	-	-	71
47	Western mosquitofish	Gambusia affinis	1	1	-	-	1	-	674	-	-	-	-	677
48	Brook silverside	Labidesthes sicculus	9	28	-	-	-	-	70	-	-	-	-	107
49	White perch	Morone americana	-	-	1	-	1	-	-	-	-	-	-	2
50	White bass	Morone chrysops	348	256	1261	76	1666	25	964	22	45	5	-	4688
51	Yellow bass	Morone mississippiensis	1	-	3	4	1	-	-	-	1	-	-	10
52	White x striped bass	M. chrysops x M. saxatilis	-	-	-	-	-	-	-	-	-	1	-	1
53	Green sunfish	Lepomis cyanellus	5	-	12	-	11	1	-	2	-	-	-	31
54	Warmouth	Lepomis gulosus	7	-	3	4	11	1	-	-	-	-	-	26
55	Orangespotted sunfish	Lepomis humilis	-	3	2	-	4	-	2	-	-	-	-	11
56	Bluegill	Lepomis macrochirus	68	28	246	26	446	11	35	46	1	-	-	907
57	Redear sunfish	Lepomis microlophus	-	-	8	-	-	-	-	-	-	-	-	8
58	Green sunfish x bluegill	L. cyanellus x L. macrochirus	1	-	9	-	3	-	-	1	-	-	-	14
59	Largemouth bass	Micropterus salmoides	89	19	6	-	42	-	38	-	-	6	-	200
60	White crappie	Pomoxis annularis	3	-	16	1	31	7	7	1	1	-	-	67
61	Black crappie	Pomoxis nigromaculatus	8	2	47	8	116	-	14	3	1	2	-	201
62	Mud darter	Etheostoma asprigene	-	-	-	-	1	-	-	-	-	-	-	1
63	Johnny darter	Etheostoma nigrum	-	-	-	-	2	2	-	-	-	-	-	4
64	Logperch	Percina caprodes	1	-	-	-	7	-	15	-	-	-	-	23
65	Slenderhead darter	Percina phoxocephala	-	-	-	-	-	-	1	-	-	-	-	1
66	Sauger	Stizostedion canadense	34	54	6	6	106	3	9	1	-	2	1	222
67	Walleye	Stizostedion vitreum	2	5	3	1	2	2	-	-	-	-	-	15
68	Freshwater drum	Aplodinotus grunniens	109	581	149	132	263	150	7	12	59	43	5	1510
			=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
			6689	2988	1953	529	6952	409	7614	470	937	313	53	28907

Gears: D - Day electrofishing  
 N - Night electrofishing  
 F - Fyke netting  
 X - Tandem fyke netting  
 M - Mini fyke netting  
 Y - Tandem mini fyke netting

S - Seining  
 HS - Small hoop netting  
 HL - Large hoop netting  
 G - Gill netting  
 T - Trawling (4.8-m bottom trawl)

Table 6.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by day electrofishing in the La Grange Pool of the Illinois River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 6.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Spotted gar	0.01 (0.01)		0.06 (0.06)							
Longnose gar	0.12 (0.08)					0.17 (0.12)		0.11 (0.08)		
Shortnose gar	0.34 (0.12)		0.39 (0.14)			0.33 (0.16)		0.11 (0.08)		
Skipjack herring	0.91 (0.32)		0.39 (0.20)			1.11 (0.46)		0.89 (0.40)		
Gizzard shad	107.34 (44.33)		59.83 (21.85)			129.83 (63.18)		32.17 (10.61)		
Threadfin shad	3.92 (1.78)		0.33 (0.14)			5.28 (2.55)		3.44 (1.91)		
Goldfish	0.15 (0.11)					0.22 (0.15)				
Red shiner	0.25 (0.11)		0.22 (0.13)			0.28 (0.16)				
Common carp	3.22 (0.58)		2.67 (0.90)			3.39 (0.75)		3.67 (0.93)		
Silver chub	0.04 (0.04)					0.06 (0.06)				
Golden shiner	0.03 (0.03)		0.11 (0.11)							
Emerald shiner	11.50 (8.71)		2.89 (1.51)			13.94 (12.42)		22.78 (21.31)		
Bluntnose minnow	0.08 (0.08)					0.11 (0.11)				
Bullhead minnow	0.04 (0.04)					0.06 (0.06)				
River carpsucker	0.04 (0.04)					0.06 (0.06)		0.06 (0.06)		
Highfin carpsucker								0.06 (0.06)		
Smallmouth buffalo	1.08 (0.25)		0.39 (0.16)			1.33 (0.35)		1.06 (0.49)		
Bigmouth buffalo	0.50 (0.13)		0.50 (0.19)			0.50 (0.17)		0.50 (0.15)		
Black buffalo	0.07 (0.04)		0.11 (0.08)			0.06 (0.06)				
Shorthead redhorse	0.07 (0.04)		0.11 (0.08)			0.06 (0.06)		0.06 (0.06)		
Yellow bullhead	0.01 (0.01)		0.06 (0.06)							
Brown bullhead	0.03 (0.02)		0.11 (0.08)							
Channel catfish	0.26 (0.10)		0.11 (0.08)			0.33 (0.14)				
Flathead catfish	0.05 (0.04)		0.06 (0.06)			0.06 (0.06)				
Grass pickerel								0.06 (0.06)		
Blackstripe topminnow	0.04 (0.02)		0.17 (0.09)							
Western mosquitofish	0.01 (0.01)		0.06 (0.06)							
Brook silverside	0.12 (0.06)		0.44 (0.25)					0.06 (0.06)		
White bass	5.15 (1.40)		2.17 (0.83)			6.17 (1.96)		6.56 (4.51)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.3.1. Mean catch-per-unit-effort and (standard error) for fishes collected by day electrofishing in the La Grange Pool of the Illinois River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 6.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Green sunfish	0.08 (0.06)		0.17 (0.17)			0.06 (0.06)				
Warmouth	0.10 (0.10)		0.39 (0.39)							
Bluegill	0.99 (0.33)		0.50 (0.34)			1.11 (0.45)		1.83 (0.85)		
Green sunfish x bluegill	0.04 (0.04)					0.06 (0.06)				
Largemouth bass	1.03 (0.27)		0.89 (0.24)			1.00 (0.36)		2.28 (1.64)		
White crappie	0.04 (0.04)					0.06 (0.06)		0.11 (0.08)		
Black crappie	0.09 (0.06)		0.17 (0.17)			0.06 (0.06)		0.17 (0.09)		
Logperch								0.06 (0.06)		
Sauger	0.31 (0.14)		0.06 (0.06)			0.39 (0.20)		0.44 (0.28)		
Walleye								0.06 (0.06)		
Freshwater drum	1.06 (0.54)		0.39 (0.39)			1.33 (0.76)		0.72 (0.34)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, offshore. TRI - Tributary mouth.  
 IMPO - Impounded, shoreline. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by night electrofishing in the La Grange Pool of the Illinois River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 6.1). See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar	0.13 (0.08)		0.20 (0.13)			0.10 (0.10)		0.30 (0.21)		
Shortnose gar	0.19 (0.08)		0.40 (0.16)			0.10 (0.10)		0.40 (0.22)		
Goldeye								0.10 (0.10)		
Skipjack herring	0.44 (0.25)		0.30 (0.30)			0.50 (0.34)		0.40 (0.40)		
Gizzard shad	28.52 (9.43)		69.40 (34.49)			11.40 (4.06)		58.90 (32.06)		
Threadfin shad	1.30 (1.19)		0.40 (0.22)			1.70 (1.70)		0.20 (0.20)		
Goldfish	0.03 (0.03)		0.10 (0.10)							
Red shiner	0.07 (0.07)					0.10 (0.10)				
Common carp	2.76 (0.73)		1.70 (0.75)			3.30 (1.01)		0.50 (0.31)		
Silver chub	0.01 (0.01)							0.20 (0.20)		
Golden shiner	0.03 (0.03)		0.10 (0.10)							
Emerald shiner	2.13 (0.81)		5.20 (2.46)			1.10 (0.74)		0.60 (0.40)		
River carpsucker	0.08 (0.07)					0.10 (0.10)		0.20 (0.20)		
Smallmouth buffalo	1.46 (0.65)		2.30 (2.30)			1.10 (0.38)		2.30 (0.91)		
Bigmouth buffalo	0.22 (0.15)		0.30 (0.21)			0.20 (0.20)		0.10 (0.10)		
Black buffalo	0.05 (0.05)		0.20 (0.20)							
Golden redhorse	0.07 (0.07)					0.10 (0.10)				
Shorthead redhorse	0.03 (0.03)		0.10 (0.10)							
Yellow bullhead	0.07 (0.07)					0.10 (0.10)				
Brown bullhead	0.03 (0.03)		0.10 (0.10)							
Channel catfish	0.49 (0.24)		0.10 (0.10)			0.60 (0.34)		1.10 (0.89)		
Flathead catfish	0.42 (0.28)					0.60 (0.40)		0.10 (0.10)		
Pirate perch								0.10 (0.10)		
Blackstripe topminnow	0.03 (0.03)		0.10 (0.10)							
Western mosquitofish	0.07 (0.07)					0.10 (0.10)				
Brook silverside	0.67 (0.27)		2.60 (1.05)					0.10 (0.10)		
White bass	5.32 (2.86)		2.30 (1.71)			6.60 (4.06)		2.90 (1.24)		
Bluegill	0.71 (0.34)		1.30 (0.78)			0.50 (0.40)		0.50 (0.17)		
Largemouth bass	0.62 (0.23)		1.00 (0.49)			0.50 (0.27)		0.20 (0.13)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.3.2. Mean catch-per-unit-effort and (standard error) for fishes collected by night electrofishing in the La Grange Pool of the Illinois River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 6.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Sauger	0.98 (0.41)		0.60 (0.60)			1.10 (0.55)		1.20 (0.81)		
Walleye	0.10 (0.07)		0.10 (0.10)			0.10 (0.10)		0.10 (0.10)		
Freshwater drum	9.64 (3.57)		1.10 (0.90)			12.60 (5.09)		12.60 (7.91)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.3.3. Mean catch-per-unit-effort and (standard error) for fishes collected by fyke netting in the La Grange Pool of the Illinois River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 6.1). See text for definitions of catch-per-unit-effort and standard error.

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Spotted gar	0.11 (0.07)		0.11 (0.07)							
Shortnose gar	0.95 (0.44)		0.95 (0.44)							
Skipjack herring	0.05 (0.05)		0.05 (0.05)							
Gizzard shad	2.77 (1.36)		2.77 (1.36)							
Threadfin shad	0.39 (0.20)		0.39 (0.20)							
Common carp	0.63 (0.26)		0.63 (0.26)							
River carpsucker	0.50 (0.28)		0.50 (0.28)							
Smallmouth buffalo	0.40 (0.20)		0.40 (0.20)							
Black buffalo	0.06 (0.06)		0.06 (0.06)							
Shorthead redhorse	0.34 (0.28)		0.34 (0.29)							
Black bullhead	0.22 (0.15)		0.22 (0.15)							
Yellow bullhead	0.39 (0.33)		0.39 (0.33)							
Brown bullhead	0.56 (0.37)		0.56 (0.37)							
Channel catfish	0.06 (0.06)		0.06 (0.06)							
White perch	0.06 (0.05)		0.06 (0.06)							
White bass	57.78 (43.01)		57.78 (43.12)							
Yellow bass	0.16 (0.09)		0.16 (0.09)							
Green sunfish	0.53 (0.43)		0.53 (0.43)							
Warmouth	0.17 (0.09)		0.17 (0.09)							
Orangespotted sunfish	0.06 (0.05)		0.06 (0.06)							
Bluegill	10.68 (7.72)		10.68 (7.73)							
Redear sunfish	0.42 (0.42)		0.42 (0.42)							
Green sunfish x bluegill	0.48 (0.48)		0.48 (0.48)							
Largemouth bass	0.32 (0.22)		0.32 (0.22)							
White crappie	0.62 (0.19)		0.62 (0.19)							
Black crappie	2.42 (1.19)		2.42 (1.19)							
Sauger	0.34 (0.28)		0.34 (0.29)							
Walleye	0.17 (0.17)		0.17 (0.17)							
Freshwater drum	7.75 (4.90)		7.75 (4.91)							

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



Table 6.3.4. Mean catch-per-unit-effort and (standard error) for fishes collected by tandem fyke netting in the La Grange Pool of the Illinois River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 6.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shortnose gar	0.13 (0.09)	0.13 (0.09)								
Gizzard shad	9.35 (3.74)	9.35 (3.74)								
Threadfin shad	0.12 (0.09)	0.12 (0.09)								
Common carp	0.34 (0.12)	0.34 (0.12)								
River carpsucker	0.13 (0.07)	0.13 (0.07)								
Quillback	0.04 (0.04)	0.04 (0.04)								
Smallmouth buffalo	0.09 (0.09)	0.09 (0.09)								
Black buffalo	0.04 (0.04)	0.04 (0.04)								
Black bullhead	0.34 (0.18)	0.34 (0.18)								
Yellow bullhead	0.21 (0.14)	0.21 (0.14)								
Brown bullhead	0.08 (0.06)	0.08 (0.06)								
Channel catfish	0.17 (0.09)	0.17 (0.09)								
Flathead catfish	0.08 (0.08)	0.08 (0.08)								
White bass	3.14 (1.61)	3.14 (1.61)								
Yellow bass	0.17 (0.09)	0.17 (0.09)								
Warmouth	0.16 (0.09)	0.16 (0.09)								
Bluegill	1.10 (0.53)	1.10 (0.53)								
White crappie	0.04 (0.04)	0.04 (0.04)								
Black crappie	0.33 (0.14)	0.33 (0.14)								
Sauger	0.25 (0.14)	0.25 (0.14)								
Walleye	0.04 (0.04)	0.04 (0.04)								
Freshwater drum	5.46 (1.67)	5.46 (1.67)								

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by mini fyke netting in the La Grange Pool of the Illinois River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 6.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Spotted gar	0.01 (0.01)							0.24 (0.16)		
Longnose gar								0.05 (0.05)		
Shortnose gar	0.17 (0.09)		0.06 (0.06)			0.18 (0.13)		0.60 (0.30)		
Bowfin								0.06 (0.06)		
Skipjack herring	0.01 (0.00)							0.11 (0.08)		
Gizzard shad	2.00 (0.97)		0.22 (0.13)			2.75 (1.39)		0.56 (0.23)		
Threadfin shad	0.25 (0.10)					0.29 (0.14)		1.08 (0.70)		
Red shiner	0.02 (0.02)							0.54 (0.35)		
Common carp	0.50 (0.16)		0.47 (0.31)			0.52 (0.19)		0.27 (0.11)		
Silver chub	0.23 (0.11)		0.23 (0.18)			0.24 (0.14)		0.11 (0.08)		
Golden shiner	0.08 (0.05)		0.06 (0.06)			0.06 (0.06)		0.50 (0.39)		
Emerald shiner	5.78 (3.88)		0.29 (0.19)			0.11 (0.08)		123.49 (86.53)		
Spottail shiner	0.05 (0.04)					0.06 (0.06)		0.17 (0.12)		
Silverband shiner								0.05 (0.05)		
Bluntnose minnow	0.04 (0.04)					0.06 (0.06)				
Bullhead minnow	0.09 (0.08)		0.06 (0.06)			0.11 (0.11)				
Creek chub								0.10 (0.10)		
Smallmouth buffalo	0.54 (0.15)		0.69 (0.36)			0.47 (0.17)		0.74 (0.48)		
Bigmouth buffalo	0.32 (0.28)					0.45 (0.40)				
Golden redhorse								0.05 (0.05)		
Shorthead redhorse								0.10 (0.07)		
Black bullhead	0.99 (0.50)		1.50 (1.38)			0.87 (0.50)				
Yellow bullhead	1.08 (0.60)		0.86 (0.64)			1.23 (0.82)		0.12 (0.08)		
Brown bullhead	0.07 (0.05)		0.11 (0.11)			0.06 (0.06)				
Channel catfish	1.23 (0.62)		0.80 (0.39)			0.55 (0.27)		13.95 (13.00)		
Tadpole madtom	0.10 (0.06)		0.06 (0.06)			0.12 (0.08)				
Flathead catfish								0.11 (0.07)		
Grass pickerel	0.01 (0.01)							0.13 (0.13)		
Northern pike								0.05 (0.05)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.3.5. Mean catch-per-unit-effort and (standard error) for fishes collected by mini fyke netting in the La Grange Pool of the Illinois River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 6.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 2

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Blackstripe topminnow								0.05 (0.05)		
Western mosquitofish								0.05 (0.05)		
White perch	0.04 (0.04)					0.06 (0.06)				
White bass	48.67 (30.35)		1.18 (0.51)			68.89 (43.60)		8.20 (5.17)		
Yellow bass								0.05 (0.05)		
Green sunfish	0.17 (0.07)		0.16 (0.11)			0.17 (0.09)		0.11 (0.07)		
Warmouth	0.30 (0.15)		0.22 (0.12)			0.35 (0.21)		0.06 (0.06)		
Orangespotted sunfish	0.10 (0.06)		0.06 (0.06)			0.12 (0.08)				
Bluegill	5.59 (1.49)		1.61 (0.77)			6.94 (2.11)		7.39 (4.20)		
Green sunfish x bluegill	0.05 (0.04)					0.06 (0.06)		0.06 (0.06)		
Largemouth bass	0.36 (0.20)		0.77 (0.71)			0.24 (0.11)				
White crappie	0.28 (0.12)		0.44 (0.30)			0.23 (0.13)		0.22 (0.12)		
Black crappie	2.31 (1.11)		1.55 (1.09)			2.64 (1.54)		1.63 (1.04)		
Mud darter								0.05 (0.05)		
Johnny darter	0.04 (0.04)					0.06 (0.06)		0.05 (0.05)		
Logperch								0.05 (0.05)		
Sauger	2.06 (1.25)		0.17 (0.17)			2.76 (1.80)		2.07 (1.42)		
Walleye								0.11 (0.07)		
Freshwater drum	1.67 (0.42)		0.92 (0.45)			1.43 (0.47)		9.54 (5.22)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.3.6. Mean catch-per-unit-effort and (standard error) for fishes collected by tandem mini fyke netting in the La Grange Pool of the Illinois River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 6.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shortnose gar	0.09 (0.06)	0.09 (0.06)								
Skipjack herring	0.04 (0.04)	0.04 (0.04)								
Gizzard shad	0.45 (0.22)	0.45 (0.22)								
Threadfin shad	0.25 (0.18)	0.25 (0.18)								
Goldfish	0.04 (0.04)	0.04 (0.04)								
Common carp	0.17 (0.11)	0.17 (0.11)								
Silver chub	0.25 (0.13)	0.25 (0.13)								
Smallmouth buffalo	0.04 (0.04)	0.04 (0.04)								
Black bullhead	0.68 (0.68)	0.68 (0.68)								
Yellow bullhead	0.21 (0.12)	0.21 (0.12)								
Brown bullhead	0.04 (0.04)	0.04 (0.04)								
Channel catfish	6.42 (4.71)	6.42 (4.72)								
Tadpole madtom	0.04 (0.04)	0.04 (0.04)								
Flathead catfish	0.04 (0.04)	0.04 (0.04)								
White bass	1.07 (0.69)	1.07 (0.69)								
Green sunfish	0.04 (0.04)	0.04 (0.04)								
Warmouth	0.04 (0.04)	0.04 (0.04)								
Bluegill	0.45 (0.45)	0.45 (0.45)								
White crappie	0.29 (0.21)	0.29 (0.21)								
Johnny darter	0.08 (0.06)	0.08 (0.06)								
Sauger	0.13 (0.09)	0.13 (0.09)								
Walleye	0.08 (0.06)	0.08 (0.06)								
Freshwater drum	6.38 (2.77)	6.38 (2.78)								

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.3.7. Mean catch-per-unit-effort and (standard error) for fishes collected by small hoop netting in the La Grange Pool of the Illinois River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 6.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shortnose gar								0.03 (0.03)		
Common carp	1.60 (0.44)	1.29 (0.56)				1.79 (0.66)		1.98 (0.82)		
Silver chub	0.02 (0.02)					0.03 (0.03)				
Smallmouth buffalo	0.18 (0.13)					0.32 (0.23)				
Black bullhead	0.09 (0.05)	0.21 (0.13)						0.09 (0.09)		
Brown bullhead	0.13 (0.07)	0.17 (0.10)						1.78 (1.75)		
Channel catfish	0.91 (0.38)	0.64 (0.32)				1.12 (0.63)		0.61 (0.39)		
Flathead catfish								0.03 (0.03)		
White bass	0.35 (0.30)					0.62 (0.53)				
Green sunfish	0.02 (0.02)					0.03 (0.03)		0.03 (0.03)		
Bluegill	0.54 (0.37)	0.21 (0.13)				0.78 (0.65)		0.38 (0.23)		
Green sunfish x bluegill								0.03 (0.03)		
White crappie	0.02 (0.02)					0.03 (0.03)				
Black crappie	0.02 (0.02)					0.03 (0.03)		0.06 (0.04)		
Sauger	0.02 (0.02)					0.03 (0.03)				
Freshwater drum	0.12 (0.05)	0.08 (0.06)				0.14 (0.07)		0.12 (0.05)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, offshore. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.3.8. Mean catch-per-unit-effort and (standard error) for fishes collected by large hoop netting in the La Grange Pool of the Illinois River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 6.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shortnose gar	0.05 (0.04)	0.04 (0.04)				0.06 (0.06)				
Gizzard shad	0.41 (0.15)	0.54 (0.28)				0.34 (0.19)		0.03 (0.03)		
Common carp	2.95 (0.90)	3.02 (1.35)				2.74 (1.27)		5.58 (2.64)		
River carpsucker	0.80 (0.35)	0.54 (0.29)				1.02 (0.59)		0.20 (0.09)		
Quillback	0.03 (0.03)	0.08 (0.08)								
Smallmouth buffalo	3.63 (1.84)	5.14 (4.13)				2.71 (1.44)		1.30 (0.54)		
Black buffalo	0.04 (0.02)	0.04 (0.04)				0.03 (0.03)		0.08 (0.05)		
Black bullhead	0.05 (0.05)	0.12 (0.12)								
Yellow bullhead	0.02 (0.02)	0.04 (0.04)								
Brown bullhead	0.21 (0.14)	0.46 (0.35)				0.03 (0.03)		0.40 (0.40)		
Channel catfish	0.60 (0.18)	0.31 (0.27)				0.80 (0.25)		0.68 (0.43)		
Flathead catfish	0.03 (0.02)					0.06 (0.04)		0.06 (0.04)		
White bass	0.72 (0.46)	0.08 (0.06)				1.22 (0.82)				
Yellow bass	0.02 (0.02)	0.04 (0.04)								
Bluegill	0.02 (0.02)					0.03 (0.03)				
White crappie	0.02 (0.02)					0.03 (0.03)				
Black crappie	0.02 (0.02)					0.03 (0.03)				
Freshwater drum	0.73 (0.20)	0.29 (0.25)				1.06 (0.31)		0.32 (0.13)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.3.9. Mean catch-per-unit-effort and (standard error) for fishes collected by seining in the La Grange Pool of the Illinois River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 6.1). See text for definitions of catch-per-unit-effort and standard error.

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Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar	0.03 (0.03)					0.04 (0.04)				
Skipjack herring	0.24 (0.15)		0.35 (0.18)			0.21 (0.21)				
Gizzard shad	60.30 (20.38)		84.20 (42.60)			54.46 (24.70)		14.44 (6.71)		
Threadfin shad	0.40 (0.20)		0.65 (0.60)			0.33 (0.18)				
Central stoneroller	0.04 (0.04)							0.94 (0.94)		
Goldfish	0.17 (0.15)					0.25 (0.21)				
Red shiner	0.75 (0.35)		1.85 (1.26)			0.38 (0.20)		0.19 (0.10)		
Common carp	0.25 (0.15)		0.20 (0.16)			0.29 (0.20)				
Silver chub	0.94 (0.28)		0.50 (0.22)			0.83 (0.36)		5.00 (2.71)		
Golden shiner	0.52 (0.40)		0.35 (0.26)			0.04 (0.04)		8.88 (8.81)		
Emerald shiner	16.08 (9.85)		45.35 (38.05)			5.67 (1.64)		9.63 (4.08)		
Spottail shiner	1.33 (0.56)		0.45 (0.28)			1.71 (0.80)		0.44 (0.38)		
Silverband shiner	0.20 (0.20)					0.29 (0.29)				
Sand shiner	2.67 (2.67)					3.83 (3.83)				
Suckermouth minnow	0.03 (0.03)					0.04 (0.04)				
Bluntnose minnow	0.05 (0.03)		0.05 (0.05)					0.81 (0.57)		
Fathead minnow	0.03 (0.03)					0.04 (0.04)				
Bullhead minnow	1.57 (0.80)		0.80 (0.30)			0.83 (0.48)		17.13 (16.06)		
Creek chub	0.35 (0.25)					0.50 (0.37)				
River carpsucker	0.17 (0.07)		0.40 (0.26)			0.04 (0.04)		0.88 (0.43)		
Quillback	0.03 (0.03)					0.04 (0.04)				
Highfin carpsucker								0.06 (0.06)		
White sucker	0.03 (0.03)					0.04 (0.04)				
Smallmouth buffalo	9.23 (6.12)		3.25 (1.38)			12.04 (8.78)		0.06 (0.06)		
Bigmouth buffalo	1.14 (0.87)		0.05 (0.05)			1.63 (1.24)				
Silver redhorse								0.06 (0.06)		
Channel catfish	0.03 (0.03)					0.04 (0.04)		0.06 (0.06)		
Blackstripe topminnow	0.33 (0.15)		0.70 (0.48)					3.25 (1.95)		
Western mosquitofish	2.68 (1.45)		2.35 (1.57)			0.46 (0.25)		38.50 (30.70)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.3.9. Mean catch-per-unit-effort and (standard error) for fishes collected by seining in the La Grange Pool of the Illinois River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 6.1). See text for definitions of catch-per-unit-effort and standard error.

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Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Brook silverside	0.36 (0.19)		0.80 (0.61)					3.38 (2.55)		
White bass	13.50 (9.83)		43.90 (38.16)			3.08 (0.93)		0.75 (0.34)		
Orangespotted sunfish	0.01 (0.01)							0.13 (0.13)		
Bluegill	0.51 (0.21)		1.00 (0.72)			0.33 (0.13)		0.44 (0.18)		
Largemouth bass	0.56 (0.19)		1.20 (0.66)			0.33 (0.13)		0.38 (0.22)		
White crappie	0.09 (0.09)		0.35 (0.35)							
Black crappie	0.20 (0.13)		0.65 (0.48)			0.04 (0.04)				
Logperch	0.28 (0.13)		0.25 (0.12)			0.29 (0.18)		0.19 (0.10)		
Slenderhead darter	0.01 (0.01)		0.05 (0.05)							
Sauger	0.18 (0.07)		0.10 (0.07)			0.21 (0.10)		0.13 (0.09)		
Freshwater drum	0.12 (0.07)					0.17 (0.10)		0.19 (0.14)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



Table 6.3.10. Mean catch-per-unit-effort and (standard error) for fishes collected by gill netting in the La Grange Pool of the Illinois River using stratified random sampling during 1993. The statistics under ALL pertain to unbiased means over all strata sampled using this gear (as indicated by nonmissing entries below and by Table 6.1). See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	ALL	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Paddlefish	0.03 (0.03)	0.09 (0.09)								
Longnose gar	0.01 (0.01)		0.06 (0.06)							
Shortnose gar	0.13 (0.06)	0.08 (0.08)	0.61 (0.33)							
Goldeye	0.08 (0.05)	0.09 (0.09)	0.06 (0.06)			0.09 (0.09)				
Skipjack herring	0.07 (0.04)	0.08 (0.08)	0.23 (0.16)							
Gizzard shad	0.67 (0.26)	0.41 (0.15)	1.91 (1.21)			0.44 (0.31)				
Common carp	2.52 (0.54)	4.12 (1.16)	2.58 (0.75)			1.39 (0.76)		1.95 (1.25)		
River carpsucker	0.16 (0.05)	0.33 (0.14)	0.23 (0.13)					0.37 (0.37)		
Quillback								0.09 (0.09)		
Smallmouth buffalo	0.44 (0.12)	0.42 (0.23)	0.29 (0.16)			0.52 (0.20)		0.37 (0.28)		
Bigmouth buffalo	0.04 (0.04)					0.09 (0.09)				
Shorthead redhorse	0.21 (0.08)	0.34 (0.19)	0.52 (0.31)					0.28 (0.20)		
Channel catfish	0.12 (0.05)	0.25 (0.13)	0.23 (0.10)							
White bass	0.11 (0.06)	0.17 (0.11)	0.06 (0.06)			0.09 (0.09)		0.09 (0.09)		
White x striped bass	0.01 (0.01)		0.06 (0.06)							
Largemouth bass	0.10 (0.04)	0.17 (0.11)	0.23 (0.13)							
Black crappie	0.02 (0.01)		0.11 (0.08)							
Sauger	0.01 (0.01)		0.06 (0.06)					0.09 (0.09)		
Freshwater drum	0.72 (0.18)	0.67 (0.26)	1.42 (0.63)			0.51 (0.26)		0.38 (0.16)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.4.1. Mean catch-per-unit-effort and (standard error) for fishes collected by day electrofishing in the La Grange Pool of the Illinois River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shortnose gar									0.44 (0.20)
Skipjack herring							2.67 (1.02)		2.58 (1.40)
Gizzard shad							31.33 (24.18)		21.46 (3.20)
Threadfin shad							2.67 (1.78)		1.50 (0.96)
Red shiner							0.67 (0.49)		
Common carp							0.83 (0.48)		14.71 (2.53)
Golden shiner							0.17 (0.17)		
Emerald shiner							14.67 (11.44)		21.63 (17.58)
River carpsucker									0.38 (0.25)
Smallmouth buffalo							0.67 (0.33)		4.10 (2.05)
Bigmouth buffalo							0.17 (0.17)		0.22 (0.22)
Black buffalo									0.17 (0.17)
Channel catfish									0.83 (0.31)
Flathead catfish							0.17 (0.17)		0.17 (0.17)
White bass							3.33 (2.19)		7.92 (3.45)
Yellow bass							0.17 (0.17)		
Green sunfish									0.11 (0.11)
Bluegill							0.83 (0.83)		0.17 (0.17)
Largemouth bass							1.17 (0.48)		0.82 (0.64)
Black crappie							0.17 (0.17)		
Sauger							0.17 (0.17)		2.49 (1.11)
Walleye									0.17 (0.17)
Freshwater drum							1.33 (1.15)		9.44 (8.72)

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.4.2. Mean catch-per-unit-effort and (standard error) for fishes collected by night electrofishing in the La Grange Pool of the Illinois River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error. Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Longnose gar							0.33 (0.33)		
Shortnose gar							0.17 (0.17)		0.17 (0.17)
Goldeye							0.17 (0.17)		
Skipjack herring									0.50 (0.34)
Gizzard shad							4.17 (2.30)		22.50 (4.68)
Threadfin shad									0.17 (0.17)
Red shiner							0.33 (0.21)		
Common carp							2.83 (0.87)		12.50 (3.43)
Emerald shiner							0.17 (0.17)		1.83 (0.91)
Bullhead minnow									0.17 (0.17)
River carpsucker							0.33 (0.21)		1.50 (0.43)
Highfin carpsucker									0.17 (0.17)
Smallmouth buffalo							0.17 (0.17)		5.33 (1.12)
Bigmouth buffalo							0.17 (0.17)		0.50 (0.34)
Black buffalo									0.17 (0.17)
Shorthead redhorse									0.33 (0.21)
Channel catfish							0.17 (0.17)		0.33 (0.21)
Flathead catfish							0.17 (0.17)		0.50 (0.22)
Brook silverside							0.17 (0.17)		
White bass							5.83 (3.72)		17.17 (13.69)
Orangespotted sunfish									0.50 (0.50)
Bluegill							0.67 (0.49)		0.17 (0.17)
Largemouth bass							0.33 (0.33)		
Black crappie							0.33 (0.33)		
Sauger							0.67 (0.49)		3.50 (2.08)
Walleye									0.33 (0.21)
Freshwater drum							22.00 (17.09)		31.00 (16.85)

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.4.3. Mean catch-per-unit-effort and (standard error) for fishes collected by fyke netting in the La Grange Pool of the Illinois River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shortnose gar									0.61 (0.25)
Skipjack herring									0.40 (0.40)
Gizzard shad									0.63 (0.63)
Threadfin shad									1.05 (1.05)
Common carp									2.59 (1.37)
Goldfish x carp									0.21 (0.21)
River carpsucker									2.24 (0.60)
Smallmouth buffalo									0.39 (0.24)
Brown bullhead									1.01 (0.63)
Channel catfish									0.39 (0.39)
Flathead catfish									0.19 (0.19)
White bass									48.30 (42.07)
Green sunfish									0.40 (0.40)
Orangespotted sunfish									0.21 (0.21)
Bluegill									9.78 (7.87)
White crappie									0.98 (0.76)
Black crappie									0.62 (0.25)
Freshwater drum									2.60 (0.90)

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.4.4. Mean catch-per-unit-effort and (standard error) for fishes collected by mini fyke netting in the La Grange Pool of the Illinois River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Shortnose gar							0.16 (0.16)		0.16 (0.16)
Skipjack herring									0.16 (0.16)
Gizzard shad									0.85 (0.49)
Threadfin shad							1.46 (1.10)		0.68 (0.34)
Common carp							0.49 (0.22)		0.65 (0.65)
Silver chub							0.17 (0.17)		
Golden shiner							0.51 (0.51)		0.16 (0.16)
Emerald shiner							48.47 (46.88)		180.58 (179.96)
Spottail shiner									1.01 (0.51)
Silverband shiner									0.68 (0.51)
Bullhead minnow									0.16 (0.16)
River carpsucker							0.17 (0.17)		0.16 (0.16)
Smallmouth buffalo							0.17 (0.17)		0.17 (0.17)
Shorthead redhorse									0.17 (0.17)
Black bullhead							0.84 (0.84)		1.32 (0.70)
Yellow bullhead							0.67 (0.34)		0.65 (0.65)
Channel catfish							2.32 (1.29)		1.16 (0.78)
Tadpole madtom							0.34 (0.34)		
Flathead catfish							0.17 (0.17)		0.16 (0.16)
Northern pike									0.17 (0.17)
White bass							12.42 (10.50)		35.62 (16.33)
Green sunfish									0.49 (0.33)
Orangespotted sunfish									0.16 (0.16)
Bluegill							20.48 (10.75)		7.80 (3.75)
Green sunfish x bluegill							0.16 (0.16)		
Largemouth bass									3.93 (2.82)
White crappie							1.33 (0.84)		1.15 (0.54)
Black crappie							1.97 (0.84)		0.84 (0.65)
Logperch									0.99 (0.99)
Sauger									2.51 (1.36)

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPO - Impounded, shoreline. TRI - Tributary mouth.  
 IMPS - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.4.4. Mean catch-per-unit-effort and (standard error) for fishes collected by mini fyke netting in the La Grange Pool of the Illinois River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 2

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Freshwater drum							4.61 (2.33)		2.30 (1.48)

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.4.5. Mean catch-per-unit-effort and (standard error) for fishes collected by small hoop netting in the La Grange Pool of the Illinois River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Common carp							4.07 (1.70)		
Channel catfish							0.70 (0.52)		
Freshwater drum							0.08 (0.08)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

Table 6.4.6. Mean catch-per-unit-effort and (standard error) for fishes collected by large hoop netting in the La Grange Pool of the Illinois River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Common carp							1.13 (0.50)		
River carpsucker							0.17 (0.17)		
Smallmouth buffalo							0.09 (0.09)		
Channel catfish							0.34 (0.22)		
Flathead catfish							0.09 (0.09)		
Freshwater drum							0.26 (0.12)		

Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.

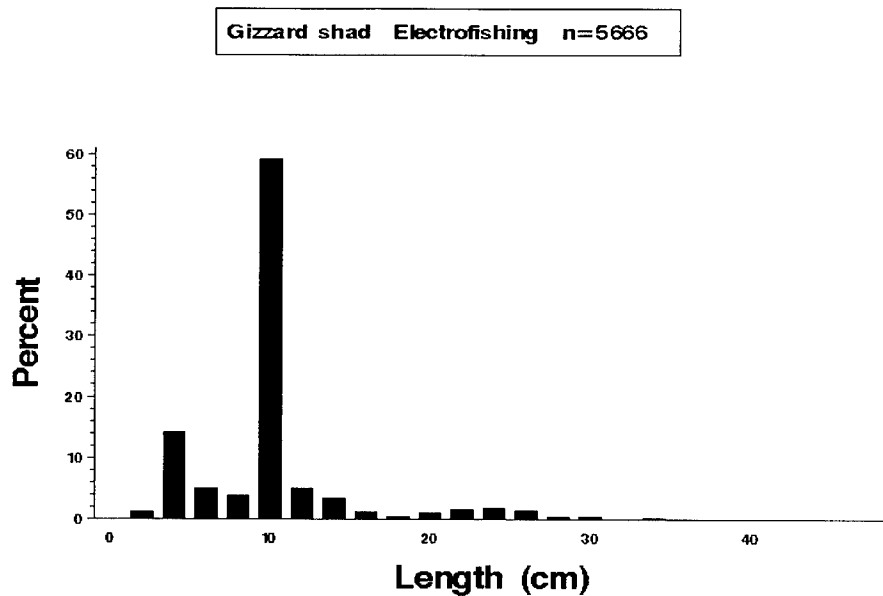


Table 6.4.7. Mean catch-per-unit-effort and (standard error) for fishes collected by bottom trawling in the La Grange Pool of the Illinois River using fixed-site sampling during 1993. See text for definitions of catch-per-unit-effort and standard error.

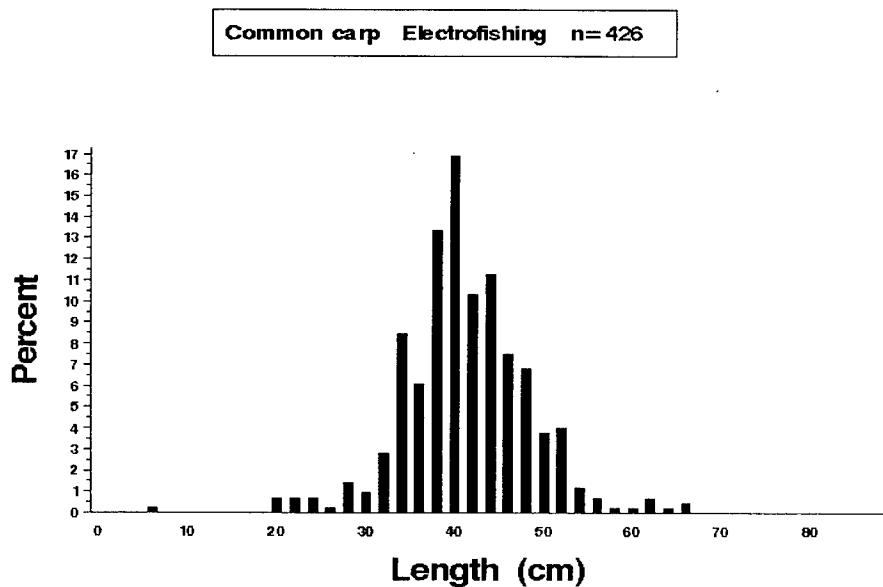
Table page: 1

Common name	BWCO	BWCS	IMPO	IMPS	MCBU	MCBW	SCB	TRI	TWZ
Silver chub									0.20 (0.20)
Channel catfish									4.50 (3.10)
Sauger									0.10 (0.10)
Freshwater drum									0.50 (0.22)

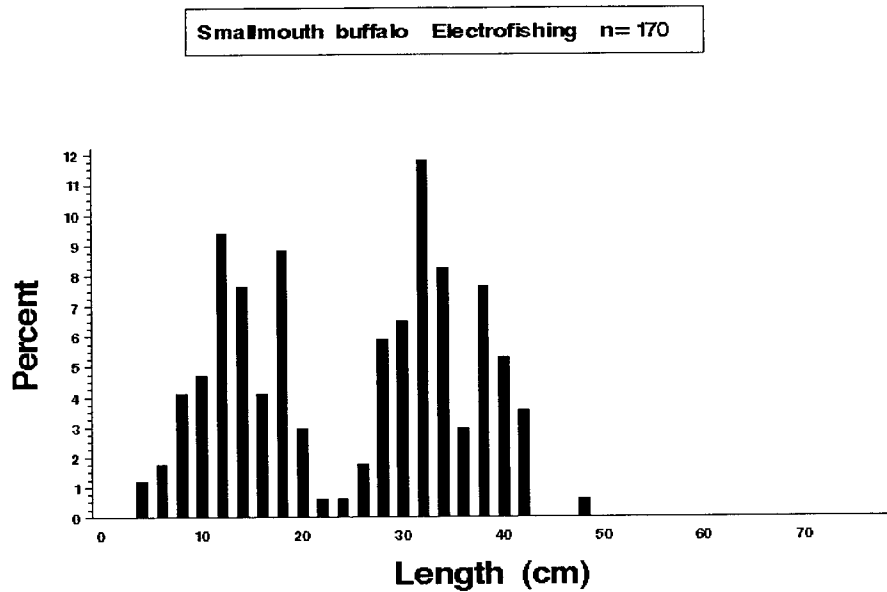
Strata: BWCS - Backwater, contiguous, shoreline. MCBW - Main channel border, wing dam.  
 BWCO - Backwater, contiguous, offshore. SCB - Side channel border.  
 IMPS - Impounded, shoreline. TRI - Tributary mouth.  
 IMPO - Impounded, offshore. TWZ - Tailwater.  
 MCBU - Main channel border, unstructured.



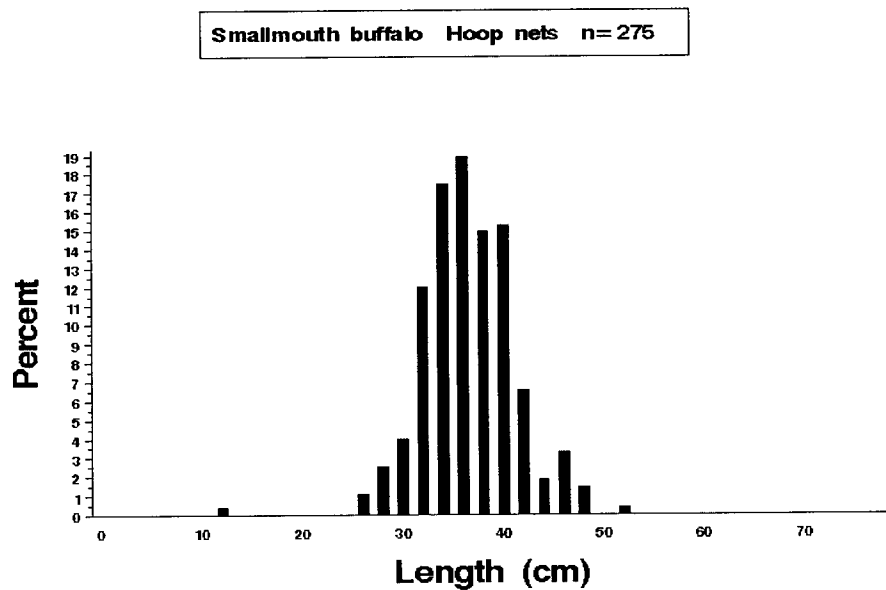
**Figure 6.2.** Length distributions (*length*) as a percentage of catch (*percent*) for gizzard shad (*Dorosoma cepedianum*) captured by electrofishing in the Illinois River, La Grange Pool during 1993.



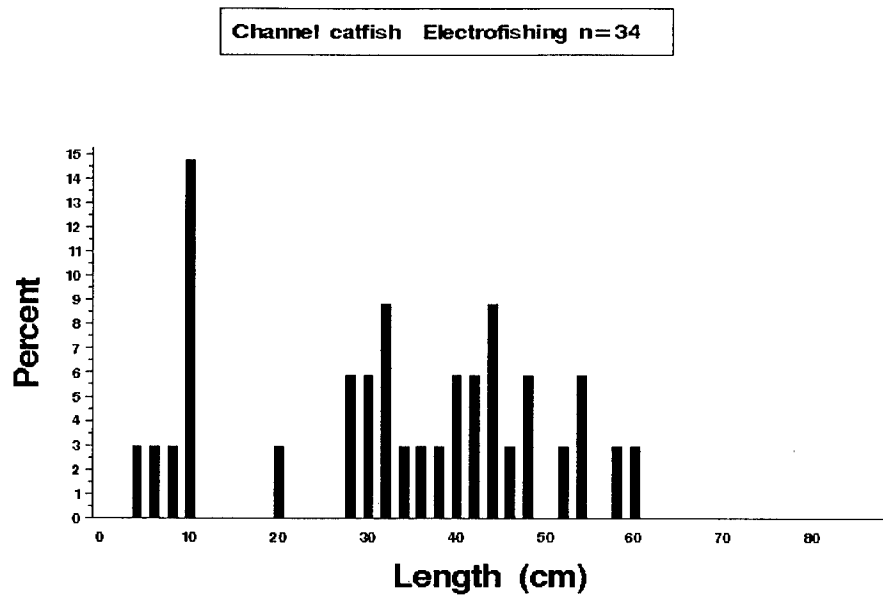
**Figure 6.3.** Length distributions (*length*) as a percentage of catch (*percent*) for common carp (*Cyprinus carpio*) collected by electrofishing in the Illinois River, La Grange Pool during 1993.



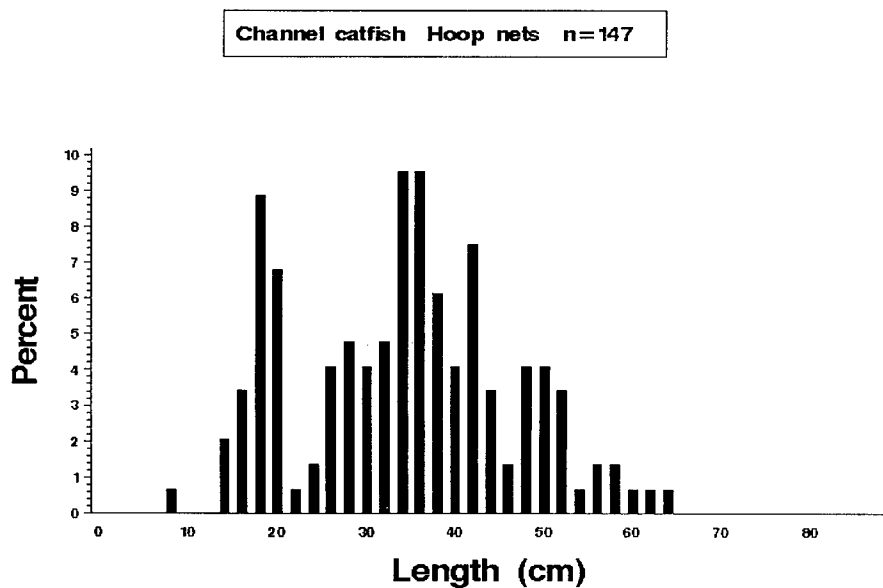
**Figure 6.4.** Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by electrofishing in the Illinois River, La Grange Pool during 1993.



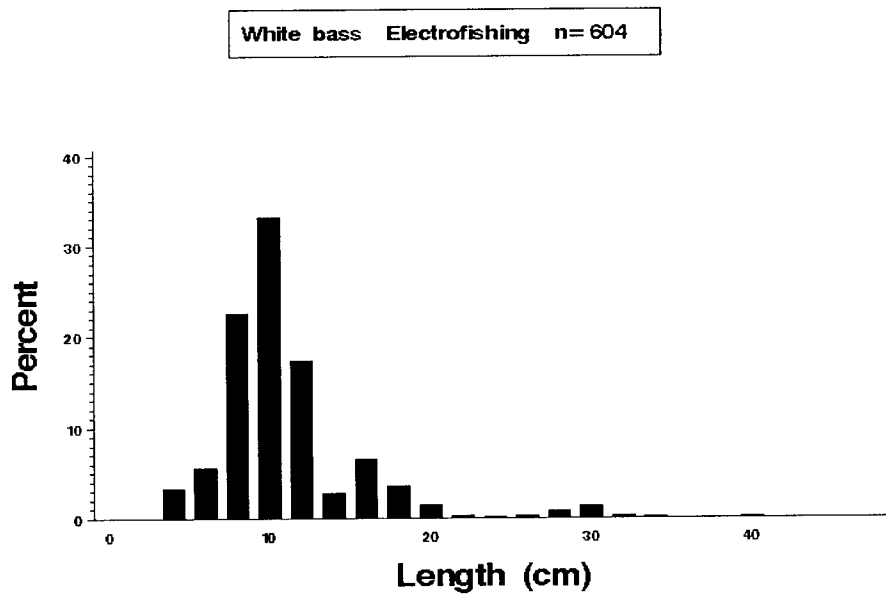
**Figure 6.5.** Length distributions (*length*) as a percentage of catch (*percent*) for smallmouth buffalo (*Ictiobus bubalus*) collected by large and small hoop netting in the Illinois River, La Grange Pool during 1993.



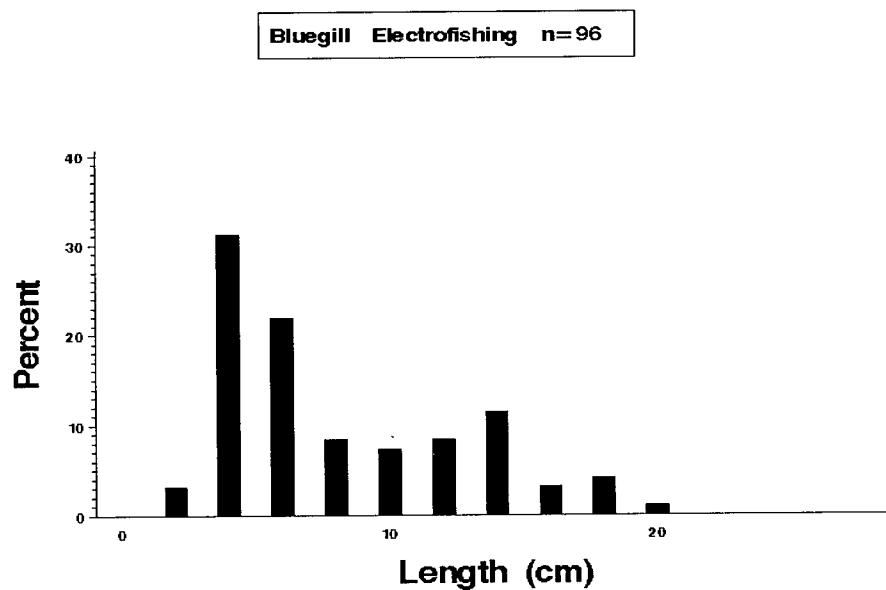
**Figure 6.6.** Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by electrofishing in the Illinois River, La Grange Pool during 1993.



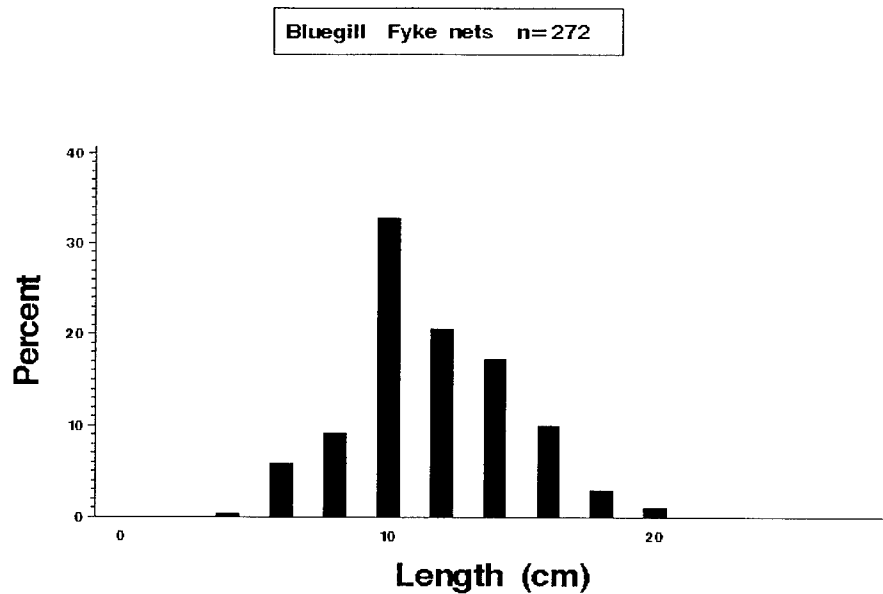
**Figure 6.7.** Length distributions (*length*) as a percentage of catch (*percent*) for channel catfish (*Ictalurus punctatus*) collected by large and small hoop netting in the Illinois River, La Grange Pool during 1993.



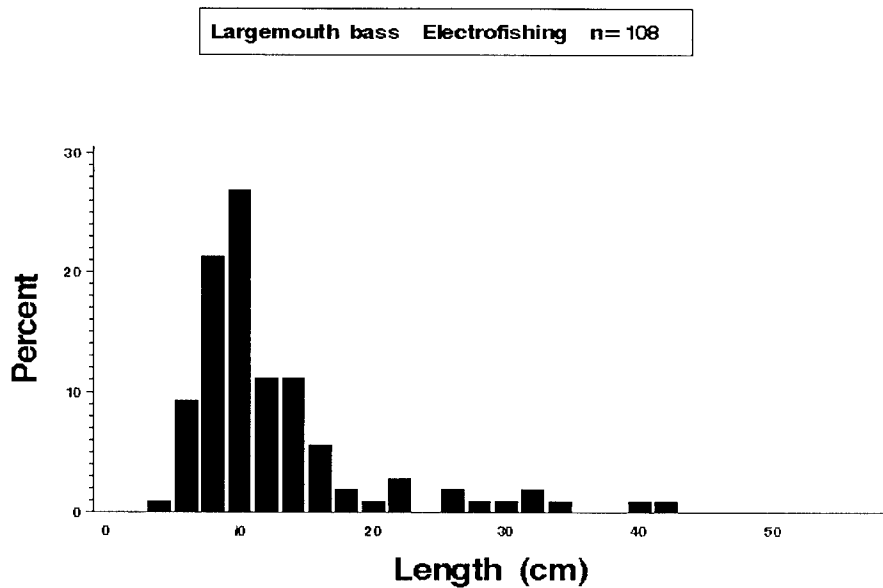
**Figure 6.8.** Length distributions (*length*) as a percentage of catch (*percent*) for white bass (*Morone chrysops*) collected by electrofishing in the Illinois River, La Grange Pool during 1993.



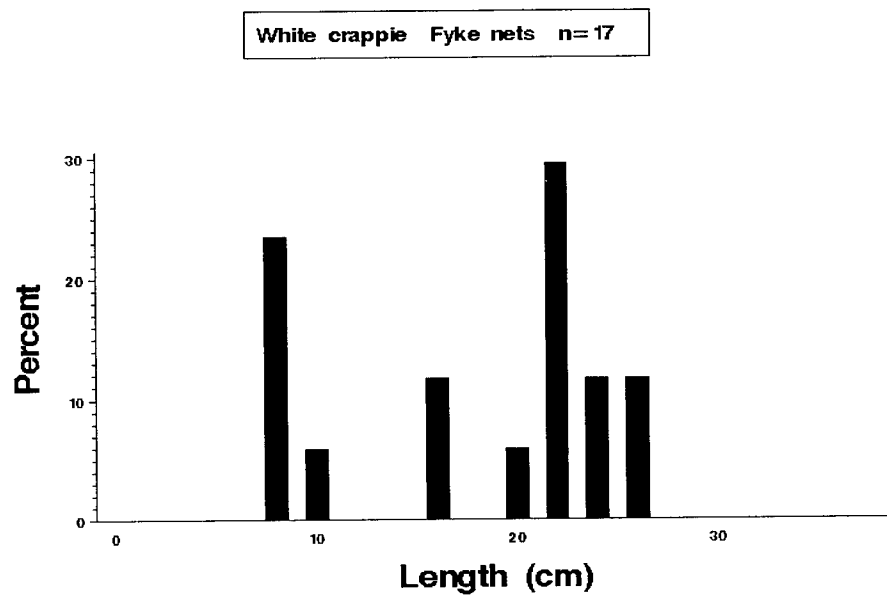
**Figure 6.9.** Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by electrofishing in the Illinois River, La Grange Pool during 1993.



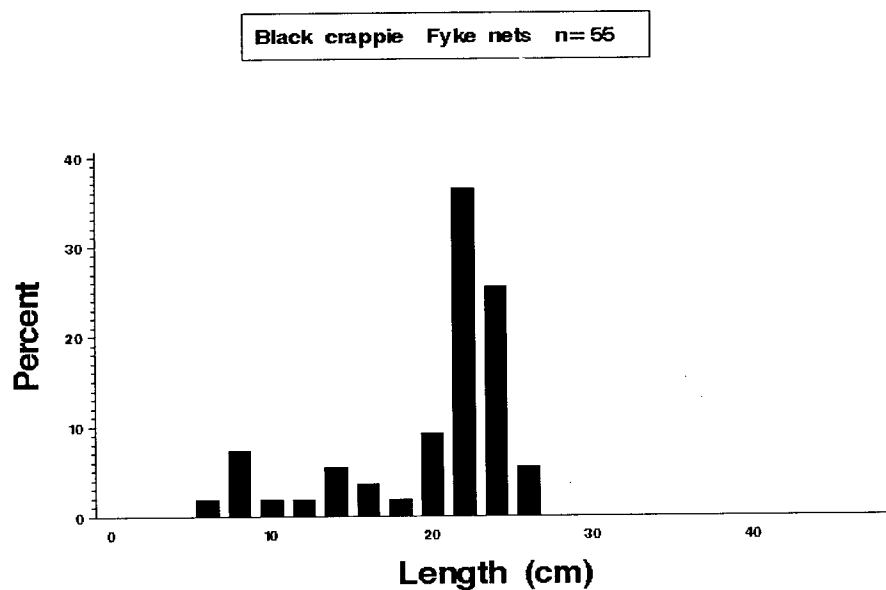
**Figure 6.10.** Length distributions (*length*) as a percentage of catch (*percent*) for bluegill (*Lepomis macrochirus*) collected by fyke netting in the Illinois River, La Grange Pool during 1993.



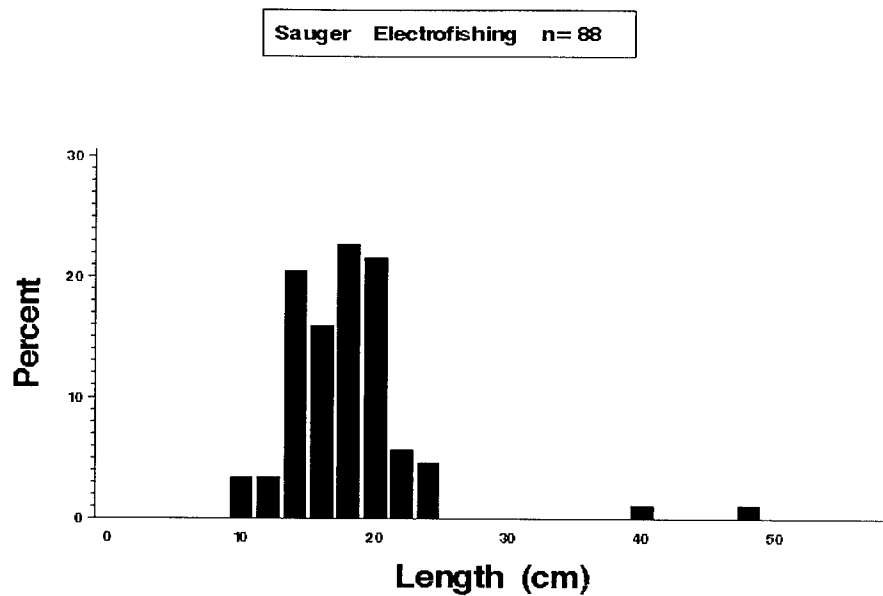
**Figure 6.11.** Length distributions (*length*) as a percentage of catch (*percent*) for largemouth bass (*Micropterus salmoides*) collected by electrofishing in the Illinois River, La Grange Pool during 1993.



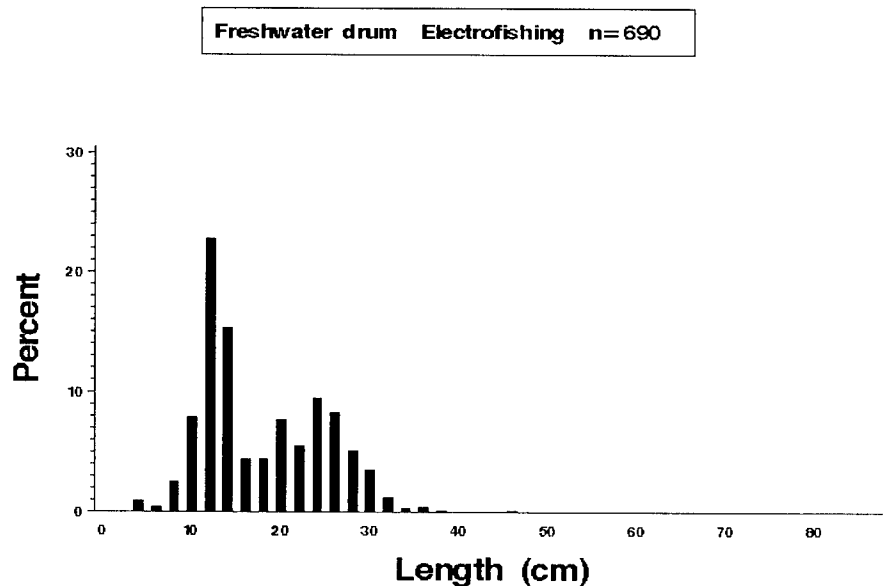
**Figure 6.12.** Length distributions (*length*) as a percentage of catch (*percent*) for white crappie (*Pomoxis annu larus*) collected by fyke netting in the Illinois River, La Grange Pool during 1993.



**Figure 6.13.** Length distributions (*length*) as a percentage of catch (*percent*) for black crappie (*Pomoxis nigromaculatus*) collected by fyke netting in the Illinois River, La Grange Pool during 1993.

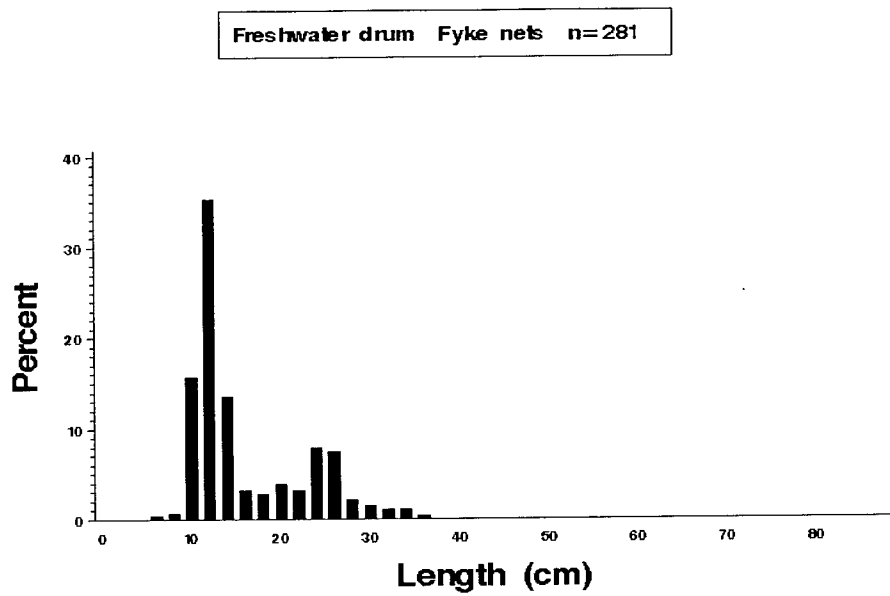


**Figure 6.14.** Length distributions (*length*) as a percentage of catch (*percent*) for sauger (*Stizostedion canadense*) collected by electrofishing in the Illinois River, La Grange Pool during 1993.



**Figure 6.15.** Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by electrofishing in the Illinois River, La Grange Pool during 1993.





**Figure 6.16.** Length distributions (*length*) as a percentage of catch (*percent*) for freshwater drum (*Aplodinotus grunniens*) collected by fyke netting in the Illinois River, La Grange Pool during 1993.

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13. ABSTRACT (Maximum 200 words) The Long Term Resource Monitoring Program (LTRMP) completed 1,994 collections of fishes from stratified random and permanently fixed sampling locations in six study reaches of the Upper Mississippi River System during 1993. Collection methods included day and night electrofishing, hoop netting, fyke netting (two net sizes), gill netting, seining, and trawling in select aquatic area classes. The six LTRMP study reaches are Pools 4 (excluding Lake Pepin), 8, 13, and 26 of the Upper Mississippi River, an unimpounded reach of the Mississippi River near Cape Girardeau, Missouri, and the La Grange Pool of the Illinois River. A total of 62-78 fish species were detected in each study reach. For each of the six LTRMP study reaches, this report contains summaries of: (1) sampling efforts in each combination of gear type and aquatic area class, (2) total catches of each species from each gear type, (3) mean catch-per-unit of gear effort statistics and standard errors for common species from each combination of aquatic area class and selected gear type, and (4) length distributions of common species from selected gear types.				
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